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THE COMPREHENSIVE review of mining operations in Australia, by Mr. Donald Clark, will be found interesting to those who desire to get a perspective view of the work done in these important mining regions. While bad industrial conditions in the great English-speaking country of the southern hemisphere have been aggravated lately by a drought of unusual severity, and by labor troubles, such as appear to be a necessary feature of communities in which a large measure of individual freedom is accorded, nevertheless, those of us who know the mining regions of Australia, and are able to compare them with older districts, appreciate fully that they have a great future, a future foreshadowed by their present importance. Australia has already offered a good field for the application of American engineering skill and American machinery, and we shall be surprised if the continued development of that continental area does not make further demands upon the engineering talent of the United States.

IN THIS ISSUE we begin a series of three articles on the occurrence of gold ores in distant regions from the pen of a contributor, Mr. C. W. Purington, whose writings are always marked by thoughtfulness and research. In effect, these contributions are a sequel to the spirited discussion which recently appeared in our pages on the origin of ores as the basis for a genetic classification. The articles already published, together with the series begun in this issue, will shortly be reprinted in pamphlet form so that our readers may at their leisure compare the findings of authoritative writers and make them the starting point for fresh investigations in the field.

⚒

WE GIVE elsewhere a brief description of a vessel recently built in England expressly for the purpose of carrying iron ore from Sweden and Norway to German ports. The ship has an advantage over our Lake ore-carrying boats of an unlimited depth of water, and is consequently built to carry a somewhat heavier cargo, her estimated load being 10,300 tons of ore on a 23-ft. draft. The remarks of our English contemporary on unloading vessels will, however, afford some amusement to Lake vesselmen. The new ship is expected to work "a revolution in the shipping trade." It is expected that she can unload her cargo of 10,000 tons in 30 hours, instead of 10 days or two weeks, which would have been required under the old methods in use. Lake carriers, which can unload, as recently shown in our columns, 5,300 tons of ore in five hours, will consider even the 30 hours now attained abroad as pretty slow time. In 30 hours one of our ships would unload her cargo at a Lake Erie port, take on a return cargo of coal and be well back towards the Sault. The introduction of some of our unloading machines would prove a notable economy in the Spanish and Norwegian ore trade.

⚒

A GOOD ARGUMENT in favor of investments in the mineral industry of this country is the large dividends that are being paid. Profits are being increased by the economical treatment of low-grade ores, the careful management of companies with large capitalizations, and the growing demand and good prices for most products. Investors in 48 mining and metallurgical companies in the United States received in May dividends amounting to $13,549,228, which is the second best record this year, and is more than was reported in 1902. Of this amount over 65 per cent, or $8,929,919, was the quarterly dividend of 1.75 per cent paid to the 31,799 preferred stockholders in the United States Steel Corporation. For business reasons this company is now retiring part of its 7 per cent preferred stock by an issue of 5 per cent bonds, which means a yearly saving. The second largest dividend payer this month was the Amalgamated Copper Company, which has declared ½ of 1 per cent, or $769,430 quarterly—an amount that is equivalent to 25 per cent of the total payments by metal mines.

In addition to the above there have been paid $243,630 by 11 Mexican mines and metallurgical works, and $51,000 by two Central American properties in which Americans are financially interested.

⚒

IN OUR ISSUE for January 3 last, we estimated the production of coal in Pennsylvania in 1902, in round figures, at 140,000,000 tons. The preliminary report of the State Mine Inspector, which has just been made public, shows that the actual production, as reported to the State authorities, was 36,911,554 long tons of anthracite and 98,947,117 tons of bituminous coal. Reducing the anthracite to the common measure of short tons of 2,000 lb., we find the production for two years past as follows:

	1901.	1902.	Changes.	Per cent.
Anthracite ...	67,094,665	41,340,940	D. 25,753,725	38.4
Bituminous ...	80,914,236	98,947,117	I. 18,032,881	22.3
Total	148,008,901	140,288,057	D. 7,720,844	5.2

While our estimate varied slightly from these official figures, in the quantities of anthracite and

bituminous, the total was very closely approximated to the close of the year. The cause of the heavy falling off in anthracite is found in the long strike, to which so many references have already been made in our columns. The increase in bituminous, which was due in part to the deficiency in anthracite, but in part also to the increased demand for fuel everywhere, did not make up the deficiency; so that the total production of the State shows a decrease of 5.2 per cent. Pennsylvania still maintains its leadership among the States as a coal producer, having furnished last year about 47 per cent of the total output of the United States. Many interesting details with regard to the coal mines of the State will be found in the article which is given in another column.

⚒

ATTENTION HAS BEEN called several times of late to the opening up of new iron-bodies in the Leadville basin in Colorado. First came the Home Company, then the Bon Air, then the Caribou and now the Coronado, the last two finds being of the most importance to the district. In the ENGINEERING AND MINING JOURNAL last week, the great iron-shoot of the Caribou was spoken of, but now the Coronado—which is a part of the Midas Mining Company properties—has located by diamond drill the second contact ore body under the parting quartzite. It was only a few months ago that Messrs. Rodman & Nicholson, for the Midas Mining Company, part of the old A. M. W. Combination, included the Coronado, which is in the heart of the residence portion of the city, in their combination. There has been iron shipped from the upper levels of this property, and after installing an immense pumping plant and preparing to work the upper levels, a number of drill-holes were put down. Summing up the results, it can be said to be a remarkable discovery. The existence of such an ore-body in the Leadville basin had been surmised, but this is the first practical demonstration. The drill-hole explorations have been carried on at the bottom, or 660-ft., level, on the north and south drift which is to connect the mine with the Midas; this drift is on top of the parting (Devonian) quartzite. The drills show this quartzite to be 32 ft. thick, and two drill-holes were sent down 180 ft., reaching the lower (Cambrian) quartzite. The normal formation between the parting quartzite and the Cambrian would be white lime, but, instead of this, the drills revealed a mass of mineralised rock, at least 40 ft. of which is good grade lead silver ore, believed to be the western continuation of the Wolcott ore-shoot. The Coronado shaft will be sent down another 200 ft., to open up this ore, while owners of surrounding territory will not be slow to search for the second contact. A number of other drill-holes are going down along the 800-ft. drift that connects the Midas and the Coronado.

⚒

CONCERNING BOOKS.

On another page we publish a critical review, by Prof. Newsom, of Leland Stanford University, of a book which must be known to many of our readers. The review is evidently written with care, and with no other purpose than to prevent the spread of error. For this reason it is published *in extenso*.

There is no doubt that in the haste to make books there is a tendency to bring out compilations of an untrustworthy character. To technical men this means a great deal, for it is much more difficult to unlearn than it is to learn, and statements not founded on facts may be made the basis of actual practice, to the confusion of every one concerned.

One of the sources of poor bookmaking is to be found in the attempt to cover a wide field by authors who possess accurate knowledge of a particular portion only of the subject treated. Many a first-class pamphlet has been amplified into a second-class book. A chapter on the specialty whereof the author has first-hand, up-to-date knowledge is sandwiched between several chapters covering matters regarding which he has no practical knowledge, so that he is driven to the paste and scissors. Thus are compilations produced; then comes a comprehensive title and a good publisher, and finally a treatise is issued which, after all, is largely a metamorphosed scrapbook. The book reviewed by Prof. Newsom does not warrant consignment amid such literary rubbish, but it is an example of the more insidious variety of publications by men of reputation who in the preparation of text-books attempt to cover a territory larger than is theirs legitimately, with the result that the accurate knowledge they possess is swamped amid much that is incorrectly stated. Prof. Newsom's protest is well taken.

⚒

THE ARLTUNGA GOLD-FIELD.

Much interest has been taken in the development of a new gold-field in the very center of the Australian continent. This district, known variously as the Arltunga or Winnecke field, has already been the basis of stock gambling of a conspicuous kind, the contradictory reports of mining engineers having knocked the shares up and down to such an extent as to create confusion regarding the real merits of the region. Fortunately, Mr. H. Y. L. Brown, the Government Geologist of South Australia, experienced in mining excitements and distinguished for good judgment in these matters, has lately inspected the mines; from his report we gather that while the first anticipations of another Coolgardie are not likely to be fulfilled, nevertheless several of the prospects give promise of developing into profitable mines. We trust this expectation will be amply fulfilled, for, apart from the future of this particular district, it is likely that the establishment of a mining center in the heart of the never-never land of central Australia will be of great service in the prospecting of the surrounding region, by affording a distributing point for supplies and a convenient place for outfitting, preparatory to exploratory work over the desert country. It was thus that Southern Cross, Coolgardie and Menzies, in turn, helped forward the development of the inhospitable regions of West Australia.

⚒

THE TANGANYIKA CONCESSIONS.

Lake Tanganyika is the longest body of fresh water in the world, and fills an enormous crevasse in the very heart of Africa. Although Tanganyika was discovered by Speke and Burton in 1858, it was not until 1874 that Cameron proved it to be independent of the Nile watershed. In 1880 it was demonstrated to be tributary to the Congo.

These data are quoted in order to suggest how recently this region has emerged from the gloom of the dark continent. It is a fact, therefore, eloquent of modern enterprise when we find the name of Tanganyika adorning the title page of a voluminous mining report containing a full account of exploratory operations carried on during the past two years.

The report of the company known as the Tanganyika Concessions, Limited, covers 130 pages, and is accompanied by numerous maps. Most of the reports conclude with the statement that one sample was taken for assay. These accounts of "inspections" go on with weary iteration, without giving one any practical notion of the nature of the deposits or of their value. It is all "sandstone impregnated with malachite" and "fairly well impregnated," until one aches for a definite miner-like statement of fact.

Finally there comes a more serious report by Mr. J. R. Farrell, who was described by the chairman of the company as "the eminent American engineer."

Mr. Farrell's report contains important statements. He emphasizes the entire absence of igneous and metamorphic rocks. "It seems to be a country without faults or dykes—there is nowhere any evidence of eruptive or volcanic disturbance. It is a most extensive and wonderfully regular country of sedimentary formation." This is said to be the "well-known old African red sandstone" forming "the main divide of the African continent," which has been subjected to a great crustal uplift and earth movement, arching the strata so as to form a "tremendous crack of the earth's surface." "It is along this great fissure that the mines of Katanga are found." They occur over a length of 40 miles, marked by outcrops of "sandy sugary honeycombed quartz, the cavities of which are filled with masses of pure malachite, nearly all botryoidal in form, while the quartz itself carries little value." "With the exception of one piece of copper pyrites found on the Luuisha Mine," Mr. Farrell saw "not a particle of sulphide ore at any of the properties examined." "The sandy, honeycombed quartz, etc., the perfect stratification of the laminated ores, etc., point irresistibly to the conclusion that the copper ores were deposited from solutions coursing upwards through the fissure. It looks certain that the hot saturated waters pouring upwards first deposited with much rapidity their surcharged siliceous contents forming the sugary, honeycombed quartz, the many cavities of which were fitting hosts for the malachite found in them, and then very gradually and gently layer after layer of sandstone and malachite was deposited until the present great ore bodies were formed." Mr. Farrell then proceeds to say: "It has to be taken for granted that as depth is attained in working the reefs the sulphide zone will be reached, but so great are the known masses of carbonate ore that all questions as to the treatment of more refractory materials may be safely left for the consideration of generations yet unborn."

From the reports it is made clear that native pits occur all over this region and that they, in a few instances, have been followed up by prospecting shafts and cuts of varying, but always shallow (15, 29, 37, 40 ft.) depth. On this unsatisfactory and inconclusive evidence, Mr. Farrell informs the company: "These different data will expose a body of *solid ore, 1,500 ft. in length, 1,000 ft. in width, which can be quarried for an average depth of at least 100 ft. These measurements give about 10,000,000 tons of ore above this 100-ft. level.* When it is remembered that this is *but one of several ore-bodies* upon Kambove No. 2, and that it would be a mere hazard of opinion to state that this mine will be more generous in yield than several of your other properties,

it is certain that I am well within limits in stating that it will be *utterly impossible*, by fully supplying any reduction plants you may desire to erect, *to exhaust your bodies of oxidized ores during this century.*" The portions which we italicize speak for themselves. It amounts to this, that because the ore seen in a few prospect shafts *can* be quarried to a depth of a hundred feet, therefore the ore may be safely estimated to continue to that depth in colossal proportions.

The average contents of the ore are placed at 15 per cent copper. This is done on the basis of a list of samples numbering 44 only! Forty-four samples for 10,000,000 tons of ore! The samples were divided into two, one-half being assayed on the ground and the other half by Johnson, Matthey & Co., in London. The report concludes with, among other statements, the following: "As the result of my examinations, therefore, I have to inform you that your company is in possession of a mineral belt lying along the northern side of the Congo-Zambesi divide, which must be considered as at least one of the great mineral zones of the world."

We have given these extracts at some length because the Tanganyika Concessions, Limited, is apparently, from the name of the firm who organized it and the voluminous matter now published, an honest flotation. Moreover, even the reports, inconclusive and unsystematic in character though they be, are, we believe, prepared by men who desire least of all to deceive any one. The matter has been chosen for comment simply because it illustrates how mining can be stultified.

In the face of the large statements submitted, it is fair to ask for evidence that the various aspects of a most difficult problem have been carefully considered. Of this there is little evidence. The geological theories and suggestions contained in the Tanganyika report are indefensible. The successive deposition of layers of sandstone and malachite is a geological *delirium tremens*. In any event, it is mere padding, quite beside the point at issue—which is, is the deposit capable of being the basis of a profitable mining enterprise?

Of course, the estimates of ore are the veriest nonsense. When is it going to be appreciated that to substantiate an estimate of a million tons of ore, not to say ten times that quantity as in this case, there must be an amount of surveying, sampling, assaying and calculation, all of it laborious and painstaking, such as is equivalent in units of hard work to the number of tons quoted in the estimate? Moreover, is it not time for those who go mining to realize that it is difficult to sample and easy to assay, and that to take an absurdly small number of samples, to divide them in two and to give the duplicates to a reliable firm of assayers is a procedure which serves as a check on the assaying without in the least confirming the accuracy of the sampling. It is an old story, to take a few samples and then to cover the inadequacy of this part of the work by getting the certificate of assay of Johnson, Matthey & Co., or Claudet, or some other reputable firm. In the days of old Rameses that method had paresis!

And after all, it *is* mere child's play to assume because you have a large tract of country seamed with croppings of quartz containing oxidized copper minerals—with, as yet, no evidence whatever of sulphide ores in quantity—that, therefore, you have the essentials of a profitable copper business. The turning of copper into its equivalent of money is a process illustrating the utmost complexity of modern industry. There is the treatment of it, the fuel question, the transport problem, the conversion of the crude product into refined metal—in fact, a long series of complicated operations, all of which require favorable conditions—not to metion much time and more money—to render them successful. Nor is it unreasonable to ask for the most complete evidence that these features have been properly regarded by experienced eyes when dealing with an ore-deposit of unknown character in the very heart of Africa.

In conclusion, we will quote a fact which should make our readers in London think twice before making commitments in copper claims in new districts until they have been investigated by thoroughly experienced men. One of the largest copper companies in the United States sent its engineer to examine a mine which was being opened up for them in British Columbia. On arrival he found that the manager, a man of average ability, had driven an adit several hundred feet long, with a view to cutting a lode, the outcrop of which appeared a hundred feet higher up on the side of a hill. The outcrop consisted of a massive body of copper pyrite, high grade as to copper and traceable for a considerable distance. When the engineer had seen the outcrop and had examined it carefully, the manager asked him what kind of ore he supposed there was in the adit, which the engineer had not as yet entered. He promptly replied, "None." The manager was annoyed. They descended the hill and went through the lower workings, which consisted, not of the adit alone, but of numerous drifts, which had been extended to find the extension of the ore-body to be seen on the hill above; all in vain, for there was no copper ore, only barren iron pyrite. From the study of copper deposits and their genesis, the engineer had been able to diagnose correctly, almost with certainty, the character of the occurrence.

There is no doubt that a copper deposit in a new country, even apart from the tremendous complexities of the industrial and metallurgical features of the enterprise, is one of the most difficult of all occurrences of ore to appraise. Having regard to the facts of this case, we wonder, therefore, that our contemporary, the London *Statist*, should have ventured to conclude that the report of the Tanganyika Concessions, Limited, indicated "a looming immense copper supply," while, on the other hand, we desire to express the keenest feeling of agreement with our friend, the Mining Commissioner of the *Economist*, who, in the last issue of that financial chronicle, says: "There are only a few people in the world capable of really assessing a new copper mine." Selah!

MARKET CONDITIONS.

The metal markets at the present time are in an anomalous position. Consumption continues very large, and manufacturers are very fully employed and turning out a great quantity of finished material. At the same time, business for the present is dull. Very few new orders are coming in; buyers are generally holding back and are apparently reluctant to place new orders beyond what material has been already contracted for. For this position many causes might be assigned. The depression in securities on the exchanges has some effect. The unsatisfactory state of the markets abroad must also be taken into account, and above all the existing labor troubles, which make the future of all manufacturing concerns very uncertain.

Like most of the other metals, copper continues dull and transactions are small in amount. Holders of contracts are rather pushing delivery on account of the large current consumption, but are still refraining from purchases for the future. Holders are not pressing metal for sale, being generally believers in the strength of the position. Prices are for the moment practically lower, but some large sellers are out of the market, declining to accept the present quotations.

Tin remains rather dull and quiet, the only transactions being in moderate lots for near-by delivery. The market abroad has been rather depressed.

In lead there is no change. Consumption continues good, and deliveries are somewhat better than they were a few weeks ago, as railroad transportation presents fewer deliveries.

Spelter is the exception among the metals, and is very strong. The metal is scarce and producers fiind great difficulty in meeting current orders. The surplus stocks of this metal disappeared some time ago, and it is believed that production is below the actual requirements. The Joplin ore market shows this, as prices have again risen. The supply of ore is not up to the needs of smelters, and the output has been further restricted by floods and other troubles.

Silver remains quiet. The London demand has been fully supplied, while India is taking comparatively little at the present time. The Treasury Department on June 1st purchased 350,000 oz. for Philippine coinage, the average price being 53.964 cents per ounce delivered.

The iron market still continues to be a waiting one, conditions being controlled by very much the same points as have been already noted for the metal markets. The labor troubles have decreased the current demand for structural material, while many large buyers are holding back in anticipation of some reduction in prices. Concessions on pig iron and steel billets have already been made and more are expected. Most producers are well supplied with orders through the third quarter of the year, but fourth quarter business is still an uncertain quantity.

The Western coal market shows no change. The Lake trade is active, and coal is going forward to the Northwest very freely. Local supplies are generally good, and there is no existing trouble in the trade.

The seaboard bituminous trade is a trifle more active, though still dull. Car supply is rather poor, and arrivals at tidewater suffer in consequence. Vessels for coastwise traffic are still in demand.

In the anthracite trade demand continues very brisk, the advance in prices on June 1 not having any appreciable effect. There has been talk of labor troubles at the mines, but it is altogether likely that whatever difficulties exist will be straightened out.

At the Calumet & Hecla Mines, each skip holds 3,000 gals. of water. The skips are hoisted from a depth of 3,100 ft. in 1 minute 20 seconds, from start to stop. This is a notable performance.

True explanations of natural operations can only come from the painstaking sifting of a vast amount of evidence, ill assorted and often contradictory. Charles Darwin, for example, devoted his life to collecting facts and then comparing them; on this account most of his conclusions have stood the test of later investigation.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

WATER IN VEINS.

The Editor:

Sir.—Complying with your request,* I beg to submit the following statistics and explanatory notes concerning the flow of water in the mines at Rossland, B. C., as named herein. The flow is very much under the average of most mines in the Rocky Mountains of equal development. In the tables below, the quantity of water is given at its mean average annual flow in United States gallons per minute.

During the spring thaws and rains, in the months of March, April, May, June and July, the water in the mines increases about 30 per cent over the annual average. In the dry season, which covers the months of August, September and October, the flow decreases to about 25 per cent under the annual average, while in the winter months, November to February, inclusive, it remains about 12 per cent under the average. The total annual snowfall at Rossland is said to vary from 100 to 150 ins., but the depth on the ground at any one time seldom exceeds 4 ft. The rainfall is considerable during the months of May and June and the early part of July. The dry season occupies the latter part of July and all of August, September and October; during this period the weather is very fine. The winter season is ushered in with rains, sleet and light falls of snow during November and December.

Rossland is situated in British Columbia, about six miles north of the International Boundary Line (the 49th degree of north latitude) at a point about 300 miles from the Pacific Coast, that is, about midway in the breadth of the Rocky Mountain Cordillera at this latitude. The camp is situated on the eroded surface of a volcanic cone, at an elevation of 3,600 ft. above sea level. The country rock is gabbro. This formation and the mineral veins occurring in it are crossed by numerous dikes and fault-fissures, which are traceable down the mountain sides for some distance from the mines. The veins are fissure zones, having widths of 5 to 150 ft., an easterly and westerly strike and a dip of about 70° north. The dikes are mainly of diabase; they range in width from a couple of inches to 100 ft., or more. Their strike is northerly, and their dip toward the east.

The topography presents the usual features of a Rocky Mountain mining camp. It is surrounded by several higher mountains separated from each other by saddles. The Columbia River, which, at one place in its course, comes within seven miles of the camp, in the *deepest natural drainage* of the region, being 2,500 ft. lower than the outcrops of the vein.

As a rule, the ground-water is encountered at comparatively shallow depths, and, as a consequence, the sulphide ore commences immediately under a few feet of iron capping; seepage begins at 10 to 25 ft.; a slight flow sets in at from 25 to 50 ft., which increases rapidly until at depths of 200 to 350 ft. the maximum flow is encountered. Below 350 ft. the flow decreases gradually at first, then rapidly, until it becomes a mere seepage at the depth of 900 ft. At 1,000 ft. the workings are generally dry.

One circumstance is noteworthy in these mines, that is, that the percentage of copper decreases in the ore-bodies in about the same ratio as the water does. In fact, the ore-bodies, of the grade hitherto mined, are due to secondary enrichment and are co-terminous with the water zone described, so far as present developments would indicate.

Following are the details of the water flowage in the several mines of the camp with which the writer is familiar:

Le Roi (1901).—This mine is developed by two shafts sunk on the vein (70° dip) to depths of 940 and 1,125 ft. From these shafts the levels extend along the veins, draining them as given below:

At the 100 ft. level now only seepage.
At the 200 ft. level slight flow.
At the 300 ft. level 5 gals. per minute.
At the 350 ft. level 10 gals. per minute.
At the 450 ft. level 15 gals. per minute.
At the 500 ft. level 15 gals. per minute.
At the 600 ft. level 15 gals. per minute.
At the 700 ft. level 10 gals. per minute.
At the 800 ft. level 5 gals per minute.
At the 900 ft. level seepage.
At the 1050 ft. level dry.
At the 1125 bottom shaft dry.

The original ratio in the flow at the various levels has been lost on account of seepage through stope connections. At the 450-ft. level the workings develop two veins, parallel and 250 ft. distant from either side of the main Le Roi vein. One of these parallel veins is again developed at the 500 ft., and again on the 700-ft. level, while the other is undercut at the 900-ft. level. Where one of these parallel veins was cut on the 500-ft. level, a considerable flow of water was encountered and the ore-body there contained an average of 2 per cent, or better, of copper. At the 700-ft. level, the same ore-body was perfectly dry and contained only 0.7 per cent of copper.

Le Roi No. 2, Limited. Josie Mine (1902).—This mine is developed by two shafts sunk on the vein, one to the depth of 300 ft., the other to the depth of 930 ft. Besides these shafts, the stope workings are connected on the vein from the surface to the 700-ft. level. From the 930-ft. shaft, the workings extend along the vein, draining it as under:

At the 100 ft. level 20 gals. per minute.
At the 300 ft. level 10 gals. per minute.
At the 500 ft. level 5 gals. per minute.
At the 700 ft. level 2½ gals. per minute.
At the 900 ft. level dry.

The outcrop of the Josie vein runs through a hill, whose apex is 200 ft. higher than the collar of the shaft, from which the 100-ft. level is run, and which is, therefore, 300 ft. below the outcrop of the vein. This fact accounts for the heavy flow on the 100-ft. level.

As in the Le Roi Mine, the ore-deposits in this mine appear to be due to secondary enrichment, and are co-terminous with the water zone.

Number One Mine (1902).—This mine is developed by a vertical shaft, which is 850 ft. deep; stope workings and connections extend from the 400-ft. level to the surface, on the vein. From the shaft level, workings extend along the vein and drain it as under:

At the 200 ft. level 10 gals. per minute.
At the 300 ft. level 20 gals. per minute.
At the 400 ft. level 20 gals. per minute.
At the 600 ft. level 10 gals. per minute.

At the 800-ft. level just commenced, there is seepage only. In this mine, as in those previously mentioned, the water zone and the ore-deposits, due to secondary enrichment, coincide.

Nickel Plate (1902).—This mine is developed by two incline shafts, sunk on the dip of the vein (45°) to the depth of 200 ft., and by a vertical shaft sunk to the depth of 825 ft. Workings from these shafts connect with each other, and from the 825-ft. shaft the workings extend along the vein, draining it as follows:

At the 200 ft. level 60 gals. per minute.
At the 300 ft. level 25 gals. per minute.
At the 500 ft. level 40 gals. per minute.
At the 600 ft. level 20 gals. per minute.
At the 800 ft. level 5 gals. per minute.

The bottom of the shaft is dry. Seepage through connections in the mine workings has somewhat disturbed the natural rates of the water flow on the various levels. This is the wettest mine in the camp, the reason being that the workings cut several watercourses which extend for long distances into the country rock. The same relations apparently exist between the deposits of copper ore and the water zone in this mine as in the others previously mentioned.

White Bear (1903).—This mine is developed by a vertical shaft, the collar of which commences at a point 250 ft. lower than the Le Roi and Josie shafts and 400 ft. lower than the shaft on the No. 1 Mine, and about on the same level as the Nickel Plate shaft. This shaft is sunk to a depth of 850 ft., and level workings are run from it at certain depths, yielding a flow of water as under:

At the 250 ft. level 5 gals. per minute.
At the 350 ft. level 15 gals. per minute.
At the 700 ft. level 15 gals. per minute.
At the 850 ft. level 10 gals. per minute.

No stoping has yet been done in the mine, and the levels are not connected, except through the shaft. For the first 450 ft., the shaft was sunk through argillite, a formation overlying the gabbro formation in which the shafts of the other mines commence. Below the argillite it passes into the regular gabbro formation of the camp and enters an extensively mineralized zone, shown by present development to be 250 ft. wide by 600 ft. in length. The ore in this mass, taken as a whole, is very low grade, but there are in it, high-grade concentrations of considerable extent (evidently due to secondary enrichment), lying along dikes and occupying fissures running northwesterly and southeasterly. The developments on the 700 and 850-ft. levels, show six of these fissures traversing the mineralized zone. The ore is richer on the 850-ft. level than on the 700-ft. level, but what its behavior will be at greater depths remains to be proved by actual development.

Kootenay Mine. This mine is developed to a depth of 600 ft. by adits run on the vein at approximately 100 ft. apart. From the lowest tunnel, that is, No. 6, two shafts are sunk on the vein, which is practically vertical; one to the depth of 200 ft., the other to the depth of 400 ft. The quantity of water flowing from these adits ranges about as follows:

From No. 3 tunnel 10 gals. per minute.
From No. 4 tunnel 15 gals. per minute.
From No. 6 tunnel 20 gals. per minute.

The shafts, and the workings from them, below No. 6 tunnel are dry. About 50 per cent of the water flowing out of No. 6 tunnel is seepage from workings over it. No pay ore has been found where the workings are dry.

I trust the above information will serve your purpose; and before closing, the writer wishes to say that for a long time he has felt that some intimate relations exist between the *natural drainage* of a region and the ore-deposits of that region, also between the flow of water in mines and the ore-bodies; and he hopes to see these subjects fully discussed in the JOURNAL by experienced mining engineers.

I wish to thank Mr. William Thompson for assistance rendered in compiling the data recorded herein.

BERNARD MACDONALD.

Spokane, Wash., May 21, 1903.

* This refers to an article in the ENGINEERING AND MINING JOURNAL of March 14, 1903, in the course of which the existence of a water zone was suggested.

ELECTRICITY VERSUS COMPRESSED AIR.

The Editor:

Sir.—I have noted in recent issues of the JOURNAL an article on Electricity vs. Compressed Air, by Mr. W. L. Saunders, and Mr. Arthur Winslow's comment on the same. I would point out to the former gentleman that he has overlooked several other plants besides Mr. Winslow's, which have had electric drills in mines in "commercial," if not "constant," operation; and while the experience at these plants hardly indorses Mr. Saunders' seeming prejudice against the future of electric drills, it leads to conclusions similar to Mr. Winslow's, that in this particular case, air-drills would have been better.

One of the plants referred to is at the mines of the Catherine Lead Company at Frederickstown, Mo., where, under the writer's management for two years past, eight drills of the solenoid type (Marvin) have been running night and day. They gave good service so far as constancy of operation was concerned, and their mechanism is simple and easily handled. The main difficulty was that the number of feet drilled per shift was small compared to what an air-drill could do in the same rock. (Twenty-five feet per 10 hours compared to 45 ft. per 10 hours.) The rock was hard limestone, seamy and full of soft pockets, which was a particularly bad combination for a solenoid drill, whose weak point was its small pulling power just after the blow had been struck.

Repairs were heavy, costing about twice as much as for air-drills ($10 per drill per month, against $5 per dirll per month), but to offset this, the electric drill required only one-half the power (6 h.p. against 12).

At Mine la Motte, which property adjoins that of the Catherine Lead Company, six of these drills have been in use for a number of years, the results having been somewhat better, owing to a freer drilling rock.

In both of these cases, compressed air would unquestionably have given better net results, but this, together with Mr. Winslow's experience at the Liberty Bell in Colorado, should not condemn electric drills in general. The system has many inherent advantages over air, and these were greatly appreciated in the Missouri mines referred to; and testimony up to the present time has merely shown that the right mechanism has not been devised. The solenoid type, while attractively simple, has inherent limitations which probably unsuit it for work in anything but easy-drilling ground; that is, uniform in texture, not too hard, and grinding in such a way as to make the bit clear itself well. Corroboration of Mr. Winslow's experience with the flexible shaft, detached motor type are frequent, and his criticisms well-made. The most hopeful thing in sight in the electric drill field, in the writer's opinion, is the Box drill of the Denver Engineering Works, which uses the hammer instead of the reciprocating-steel principle, and also avoids the flexible shaft, by attaching the motor directly to the drilling machine. From a casual inspection of this drill while mining, it would certainly appear that the discouraging difficulties have here been overcome.

I would heartily indorse Mr. Winslow's ideas as to the testing of new machines at mines, and it is to be hoped that liberality will be shown by both manufacturers and operators in affording facilities for making tests, the results of which will be of interest to so many.

WM. MAGENAU.

Guanajuato, Mexico, May 24, 1903.

GEOLOGY AND MINING.

The Editor:

Sir.—In the discussion of the relation of the mining geologist to the economy of mining, the geologist certainly fares ill at the hands of your correspondents, and the impression would be left that he and his work are held in small esteem by the exponents of the industry were it not for your announcement that the mine owners of Cripple Creek are subscribing a fund to further a supplementary examination of this district by the United States Geological Survey. Now, when these gentlemen put their hands in their pockets and pay cash for scientific information, it is the most emphatic proof possible that they consider that such information will assist them toward increasing their dividends.

It is the writer's opinion that in the last ten years the professional geologists have shed more light on the fundamental problems of mining than has emanated from all other sources combined. It is impossible for the engineer to gauge accurately his debt to pure science—the fruits of study and experience have become so blended in his mind as to render his reading of the rocks largely subconscious—but if geology has done nothing for him except to clear his mind of superstition and false theory, great has been its work.

Peters in "Modern Copper Smelting" remarks that "practical men usually have infinitely more theories on every subject than scientific men; only they are all wrong." This is especially true of the mining man with his amazing theory that the nearer you approach the sources of the metals (i. e., the barysphere) the richer your lode becomes. This same practical man is often invaluable, but he would sometimes save money for his employers if he would turn his attention resolutely away from the genesis of ore deposits.

Before leaving the subject I cannot refrain from commenting on Mr. Purington's interesting statement that there has been bred in Cornwall a race endowed with an inherent mining instinct. If this be so, should we not be warranted in inquiring carefully into the genealogy of every applicant for a position underground? It is a proposition calling for some proof, since it is explicable only as the result of the hereditary transmission of acquired character, a principle at one time held by Herbert Spencer, but repudiated by every biologist from Darwin to Weissmann.

H. H. KNOX.

New York, May 30, 1903.

GEOLOGISTS AND ENGINEERS.

The Editor:

Sir.—As I have owned and personally operated mines pretty continuously for 18 years, besides attending to outside work, perhaps some of my ideas as to the value of the work of mining geologists, mining engineers and professional miners or mine foremen, in the valuation of mines and prospects, may be of some interest at this stage of the discussion in the JOURNAL. In the variety of mines there is no end, but I think the purchasers of mines can be put into three classes. First, mining men desirous of finding a good, permanent paying proposition; second, persons having little or no knowledge of mining, who are attracted to it by the glamor of phenomenal success; third, those who neither know nor care whether a mine is good so long as description and promises can make it a good stock seller.

Persons of the first-class are comparatively rare, as are the properties they require, so abundant time is given to the engineer and geologist for examination, and no expense is spared to make it perfect, which, under these circumstances, is comparatively easy, and the report is carefully considered by experienced men and generally accepted as conclusive. Those of the second class, not understanding what they really want, cannot appreciate the great care needed in sampling a mine, and the immense value of details, which to them appear wearisome, so they cut the engineer's work short and, in the end, often set their eagerness against his mature judgment by buying a half-examined mine, which nine times out of ten proves worthless; and for this the unfortunate expert is ever after blamed. This class, coming from every walk in life, previously successful in their own business, having money to speculate with, repudiating the advice of the competent engineer, proceed with the common assumption that any one can run a mine and send out some man more ignorant than themselves to manage their new toy, or quite as often, the very man who has promoted the sale, and who is most interested in keeping the owner in the dark. An old mining shark in California used to tell me that when he had landed an Eastern "sucker," to keep him pleasant, he always advised immediately building a mill, whether there was ore or not, on the principle of "what is a home without a mother, or a mine without a mill"! Lately, I have known of a camp cook being sent to run a gold mine, and a cowboy to operate a most difficult smelting proposition; and for the inevitable disaster in each case the engineer was blamed.

The third class is so widely known that every mining engineer must have experienced the difficulty of serving it. This would-be purchaser does not know nor does he care to know, what a good mine is; he would rather buy a good than a bad one, of course; still, he must have a good report, anyhow, even on a worthless mine, so if, unfortunately, the engineer has to make an unfavorable report it is either discarded altogether or garbled to suit. I lately condemned a gold-gravel proposition as practically nonexistent, whereupon the enterprising owner took it to an up-to-date promoter, who remarked that he did not care whether there was any gold or not, the buyers of stock would have an opportunity to gamble on the chance, and immediately proceeded to float the company.

Now, as the acquirements of our three classes of mining experts are individually quite distinct, their duties should also be better defined than is ordinarily the case. The mining geologist should confine himself to the examination of geological conditions and probabilities and advice as to ore deposition, for guidance in new work, in either new or old mines, or in the elucidation of difficulties constantly occurring in old mines by reason of faulting, change of character of ore, etc., etc.; but not exclusively for the valuation of mines as payable propositions. As an extreme illustration, I will mention a report on a mine in Arizona made by a professor of mining geology, which was admirable as a scientific dissertation of the geology of the district and special vein formation, but had to be returned for correction, because the owner could not find one word on the quality and quantity of the ore.

The mining engineer should be the man to sample and value the ground if opened, advise on the treatment of the ore, location of shafts, tunnels, etc., plan mills and smelting works; while the miner proper, the foreman, should carry out this work on the ordinary well-known lines. How different do we find things, however! Just as often as not these places are reversed, and the mature advice of the engineer ignored, for financial or other reasons. It seems to me, that if an engineer is considered competent to value a mine and large sums have been paid on his report, that his reasons for anticipating an adequate net return on the capital invested should be given commensurate weight, and his directions followed instead of turning over the work of construction and development, as is frequently done, to the machinery supply concerns.

Then there comes the question of capitalization of mining propositions. The engineer must decide what working capital will be absolutely necessary, which in the case of our first class of mining investors is thoroughly understood and promptly provided. Not so, however, with the other two classes. More often than not this estimate is arbitrarily cut down or the stock is slow of sale, while the promoters retain the majority of the stock of an immense overcapitalization and destroy all chance of making an otherwise meritorious enterprise pay. This again hurts the engineer. Another matter which deserves notice is the prevailing practice of the two latter classes of mine buyers to require the examining engineer to take all or part of his remuneration in stock, thereby putting him on the basis of no mine, no pay. Or, after making a favorable report, he is required to aid in selling the stock of probably an immensely over-capitalized company, which he feels is next to certain to fail; and this naturally lays his statements open to suspicion.

I argue from all this that a mining geologist is very necessary in his own special division, and the engineer in his, and that the two frequently overlap in practice, but should never be made to act as advertisers for stock brokers under any circumstances.

REGINALD W. PETRE.

Baltimore, May 25, 1903.

IRON TRADE OF BELGIUM.—For the first quarter of 1903 the total iron and steel exports of Belgium were 164,637 tons, an increase of 18 per cent over the first quarter of 1902. The heaviest items of exports this year were 55,493 tons of steel rails and 51,194 tons of iron and steel bars.

THE RHENISH-WESTPHALIAN COAL SYNDICATE.—According to the London *Colliery Guardian*, the revised agreement for the renewal of the Rhenish-Westphalian Coal Syndicate has been distributed among the various colliery companies for their consideration, and it is hoped that it will be adopted by the end of June, so that it may go into effect by September 30. In order to induce the independent mines to enter the syndicate, the relations of the latter to its individual members have been changed in some essential respects. It is provided, for example, that mines owned by iron companies can enter the syndicate for their sales in the general market, while excepting from its terms all coal consumed by the iron works to which they belong. An-

other important change in the agreement is that the old system of making allotments to the various collieries according to their producing capacity shall be replaced by allotments according to the state of the market.

REVIEW OF THE PROGRESS IN GOLD MINING IN AUSTRALIA DURING 1902.

BY DONALD CLARK.*

The production of gold in Australasia during 1902 amounted to 4,039,783 oz. fine, as compared with 3,724,996 oz. in 1901. Victoria alone shows a slightly decreased yield. Western Australian returns are increasing progressively, while revivals have taken place at Gympie and Charters Towers in Queensland. While good progress has been made in methods of ore treatment, much still remains to be done in Queensland and eastern Victoria. Generally speaking, more modern types of machinery are replacing the primitive appliances used—the impetus in this direction being largely due to the excellent work done at Kalgoorlie.

Production of Gold in Australasia.

State.	To end of 1902: Crude oz.	Value.	1902. Fine oz.	Value.
Victoria .	65,857,040	£263,502,881	720,866	£3,013,680
New Zealand	15,572.507	61,111,316	459,611	1,951,433
Queensl'd	16,533,055	55,472,314	640,463	2,720,639
New South Wales .	13,775,922	50,742,588	254,435	1,080,773
West. Australia (a).	9,387,090	35,436,400	1,871,037	7,947,659
Tasmania	1,205,966	4,651,203	70,996	301,573
South Australia .	652,580	2,223,408	22,405	95,129
Total..	122,984,160	£473,140,110	4,039,783	£17,110,886

(a) Based on bullion deposited at Perth Mint for export.

WESTERN AUSTRALIA.

The yield for 1902 was 2,177,441 oz. crude, valued at £7,947,659, as against 1,881,756 oz., valued at £7,244,762 for the previous year. Almost all the fields in the State show substantial increases. East Coolgardie District, which includes the Boulder group of mines, yielded, 1,116,383 oz. as against 991,368 for 1901. The other notable increase was in the East Murchisón District, which contains the Great Fingall Mine, the yield being 209,869 oz., against 146,591 for 1901.

The production and dividends of some of the mines along the Golden Mile, at Kalgoorlie, are appended:

Mine.	Tons treated.	Yield in oz.	Dividends paid in 1902.	Total tons treated.	Total yield oz.
Great Boulder....	104,231	166,513	£218,750	391,364	768,612
Lake View Cons..	78,444	80,530	.....	397,768	767,893
The Associated..	59,060	56,999	.....	306,906	245,257
Perseverance	140,573	193,292	350,000	343,195	465,587
Ivanhoe	131,800	142,293	130,000	403,934	555,913
Gold. Horseshoe.	117,366	190,119	360,000	350,864	646,545
Kalgurli	34,665	36,186	30,000	51,311	71,003
Brown Hill	14,207	37,052	45,000	172,363	345,801

To July.

The Associated Northern paid £80,000 in dividends for 1902. The profits made on the whole field amounted to more than 25 per cent of the total yield.

The Great Boulder shaft is down below 1,600 ft.; the reef was struck at this level 57 ft. west of the shaft; the first 11 ft. across averaged 27 dwt. per ton, the last 5 ft., 10 dwt. per ton. At the 1,400-ft. level the lode is the same distance from the shaft, while at the higher levels it was continuously dipping towards the Golden Horseshoe ground, the boundary of which is parallel to the Boulder line of reef. One of the richest loops in the Boulder Mine dipped into the Horseshoe ground, but it would now seem, according to late developments, that the main lode in the Boulder has taken a turn and is now underlying in the opposite direction. The other mines are opening up uniformly and are maintaining their values.

The method of treatment outside Kalgoorlie consists of crushing in stamp-batteries, amalgamating on plates, and cyaniding the sands and slimes. Concentration is not practised to any great extent, neither is roasting followed by chlorination or cyanidation adopted. At the Menzies Consolidated, good extractions are obtained by cyaniding the concentrates direct; these concentrates consist largely of arsenical pyrites. At Kalgoorlie the greatest diversity of treatment exists. At the Boulder Perseverance the whole of the ore is dry crushed in Griffin mills, roasted in Holthoff-Wethey furnaces, moistened in a mixer with returned cyanide solutions, then ground and amalgamated in pans; the whole product is slimed and treated in agitating vats for about 16 hours with a cyanide solution made up to about 0.1 per cent. The whole then passes to the pressure tanks, and is forced into filter-presses, the solutions being passed through zinc boxes and returned to the mixers, the cakes of slime going to the dump. The total cost of treatment is about $4.80 per ton. At the Great Boulder the ore is crushed in Griffin mills, roasted in Edwards furnaces, and more recently in Merton furnaces—the latter is a three-hearth furnace of the MacDougall type, and is cheaper than the other. The roasted sand is moistened with returned solutions, is ground and amalgamated in pans, the slimes then pass into a series of spitzkasten, and the thickened pulp is drawn off and sent to the agitators, the clear liquor from the spitzkasten returning to the mixers. In this way the filter-presses have less solution passing through them and the zinc boxes get a less diluted liquor. The cost has been reduced to $2.88 per ton, excluding managerial salaries. At the South Kalgurli, the ore is crushed in Griffin mills, roasted in a Brown furnace, slimed in pans, and then treated by the Riecken process. The method adopted was to run the slimes with the requisite amount of cyanide solution into a trough-shaped vessel, fitted with revolving arms which acted as anodes, while the cathodes consisted of amalgamated copper plates, which lined the vessel and from which they could readily be withdrawn. The novelty of the process consisted of employing a flowing cathode of mercury. The mercury escaped through lateral openings in a horizontal pipe which had a backward and forward motion, streams of mercury ran down the copper plate and were raised by a jet elevator to be used over again. It was said that precipitation was perfect, but when afterwards tried by the Great Boulder Company on slimes alone, this was not found to be so. It is evidently a good amalgamating device.

At the Brown Hill the Diehl process is used. By this the ore is wet crushed in stamp batteries, passed over amalgamated plates, then over Wilfley tables, the concentrates from the Wilfley are roasted in an Edwards furnace, the product is then returned to the battery and undergoes treatment with the rest of the material. The slimes are separated out by spitzkasten, the sands and heavier particles passed through flint or tube mills, which are long revolving steel-lined cylinders, containing a quantity of hard water-worn flint stones. The sand is triturated by these so finely that it will pass through a sieve having 200 holes per linear inch. The fine slimes so formed are agitated with a cyanide solution containing cyanogen bromide—and the gold precipitated in the usual way after filter-pressing the slimes. The cost of chemicals is the great drawback to this process. At the Hannan's Star Mine the concentrates are not roasted, but are all put through with the ore; roasting in other cases is said to be introduced as a substitute for grinding such tough material as pyrites. At the Lake View, dry crushing, sliming, roasting, amalgamation and cyanide methods were used, then the Diehl process, and successful experiments on a large scale carried out with the Elmore process. At the Golden Horseshoe wet crushing in stamp batteries is practised, followed by the concentration of the coarse on Wilfley tables and the fine slimes on canvas strakes. The concentrates and rich picked ore are smelted in a small blast furnace with imported lead ores, the sands cyanided and the slimes agitated and filter-pressed.

At the Kalgurli Mine, the ore is crushed in Krupp ball mills, then roasted in Edwards furnaces, run over copper plates and rough concentrators; the concentrates and coarse sands are ground in pans and amalgamated. The finely ground sands are cyanided in double-deck leaching vats; the solutions are kept in circulation by an air jet introduced at the base of a pipe leading from the bottom of the vats to the top of the sand—the escaping bubbles carry a portion of the solution as each rises, and thus keep up a constant circulation as well as aeration of the liquor. When gold ceases to dissolve in the upper vat the sands are dumped into the lower, fresh solutions are run on and the gold content reduced. The slimes mixed with the cyanide solution are agitated by bubbling air through them in the pressure tanks, after which they are forced into filter-presses and treated as before.

The detailed costs at this mine, which is indicative of the field, are as follows:

	Pence.	Cents.
Treatment costs per ton superintendence	9.32	18.54
Rock-breaker, including power	8.71	17.42
Power, steam	48.21	96.42
Aerial tram	3.23	6.26
Ball mill	10.97	21.94
Furnaces	53.67	107.34
Classification, amalgamation, cyaniding and filter pressing	116.63	233.26
Oiling and attendance	4.55	9.10
Electric lighting	4.63	9.26
Precipitation and smelting	10.96	21.92
Assaying	4.65	9.30
General	6.70	13.40
Proportion administrative expenses	20.12	40.24
Total	£1 5s. 2.35d.	$6.0470
Average yield per ton		1.066 oz.
Average value of residues		2.01 dwts.
Extraction per cent		91.38
Cost of mining, per ton	10.7d.	$2.54

The main features of the treatment are the sliming of the bulk of the material and the prolonged contact from start to finish with dilute cyanide solutions, rarely stronger than 0.1 per cent.

A supply of water will be available in 1903 from the Coolgardie water supply scheme. The water is pumped in successive stages for 300 miles, and elevated 1,000 ft. The supply will help to reduce costs materially, and lessen the discomforts of living on the gold-fields.

VICTORIA.

Victoria comes next, with a gold yield of 777,738 oz. crude gross or 720,866 oz. fine. The following districts were the main producers:

	Oz.
Bendigo	184,959
Ballarat	62,711
Pitfield and Rokewood	57,188
Maryborough	39,353
Chiltern and Rutherglen	35,551
Creswick and Clunes	27,729
Maldon	32,675
Omeo, Glen Wills, etc.	26,621
Walhalla	25,676
Castlemaine and Fryers Creek	23,539
Stawell	20,716
St. Arnaud	19,708

The total dividends paid were £472,135, of which £212,637 was distributed at Bendigo. The calls at Bendigo amounted to £131,631 for the year, and the dividends were greater by £28,857 than in 1901. The main dividend payers were: The Clarence United, £29,250; Great Northern, £16,500; Hustler's Reef No. 1, £31,372; New Moon, £23,400; S. New Moon, £59,200.

The main line of reef is the New Chum, where work is chiefly confined to the deeper levels. At the New Chum Railway mine a depth of 3,770 ft. has been reached. Only one mine on this line, the Great Central Victoria, was a dividend payer for the year—the gold coming from the 2,715-ft. level. With this exception deep sinking has not been profitable. The Garden Gully line had several dividend payers. The Sea and Garden Gully United worked out a saddle reef missed in the earlier operations at the 1,600-ft. level. The Carlisle has a large body of low-grade stone between the 2,000 and 2,500-ft. levels. The Johnson's line has many shafts down more than 2,000 ft. Johnson's Reef, 2,555 ft.; North Johnson's, 2,880; Princess Dagmar, 2,418 ft. The gold at the Clarence comes from above the 2,000-ft. level.

Hustler's line produced gold through the discovery of a rich saddle at 1,330 ft., which was missed in former years. It would seem as if most of the gold in Bendigo comes from levels not exceeding 2,000 ft. deep—and that much profitable work remains from saddles missed in the upper levels.

The Ballarat District includes Ballarat, where the mining is mainly on reefs; Creswick and Clunes, alluvial; Rokewood and Pitfield, where gold is won both from alluvial deposits and reefs. The total gold for the

* Principal of the Bairnsdale District School of Mines, Victoria.

district was 169,054 oz., being a decrease of 5,013 oz., as compared with 1901. The dividends were £142,466, being an increase of £8,000 on 1901. The main dividend payers were: The Berry Consols Extended, £12,000 (alluvial); Birthday, £12,000; Glenfine South, Pitfield (alluvial and quartz), £21,000; Jubilee, £13,500.

All the profitable quartz from these came from less than 1,000 ft. in depth. Ordinary crude milling methods are adopted, the concentrates being sold to chlorination customs works. There is a large tract of country still to be worked for alluvial. Rich alluvial leads passed under basaltic rock, or into deep drifts through which shafts could not be sunk. Underground reservoirs had to be pumped out. The capital required was beyond the range of Victorian mining. English capital has been introduced by the New Havillah and the Charlotte Plains Proprietary Company. A central electric power plant supplies the mines; £92,000 has been spent in opening up the mines and at present 6,000,000 gallons of water are pumped out daily. The draining of the country may take years before the wash can be removed. The Moolert group, comprising 4,000 acres, is also British owned. The Duke United, in the same district, produced 10,466 oz., and paid £1,000 in dividends for the year.

The Rutherglen District also embraces a wide area of unworked deep alluvial ground, the greater part of which has been proved to be payable. Refractory ores exist in the eastern part of Victoria. At Bethanga, about 500 tons per month of arsenical pyrite, galena, chalcopyrite and iron pyrite are roasted in hand-rabbled reverberatory furnaces; the product is treated by the Black-Etard process, that is sulphuric acid, salt and potassium permanganate; the solution containing the gold and copper is saturated with sulphur dioxide, and the precipitated gold filtered through sawdust. The copper is afterwards precipitated on scrap iron. The operation is very successful.

In the Cassilis District, where the ore is even more complex, the ore is wet crushed, concentrated on Wilfleys, the concentrates chlorinated by the Black-Etard or Munktill process or by cyanide solutions. The Cassilis Mine is producing about 1,000 oz. fine gold per month, but the extraction is only about 68 per cent. No gold is visible either in the stone or by examination, after panning off, under the microscope, yet tellurium has not been found in the ore.

QUEENSLAND.

The crude gold produced amounted to 860,453 oz. crude, or 640,463 oz. fine., the value of which was £2,720,639, being an increase of 42,081 oz. fine, valued at £178,747, on the previous year. The drought affected the returns from Mt. Morgan. The main producing fields are:

	Oz. fine gold.
Charters Towers	265,244
Croydon	28,355
Gympie	120,622
Mt. Morgan	142,826
Ravenswood	40,969

The yield from stone at Charters Towers was 220,375 oz. from 221,009 tons, as against 204,782 oz. for 1901; while from tailings, 140,092 oz. were won, as against 154,621 oz. for 1901, the decrease being due to the exhaustion of the old tailings heaps. The reefs on this field are very flat, and vary from 1 to 4 ft. in thickness, with occasional bulges. They are persistent to great depths, the payable shoots are long, and average over 1 oz. per ton. Few mines possess milling plants. The custom plants crush, concentrate, grind the concentrates in Wheeler's pans, amalgamate in Berdans and cyanide the slimes, residues and sands—the appliances being unsuited for economical or effective work. The main producers were:

	Tons Treated.	Ounces won.	Dividends.
Queen Cross	18,289	45,368	£116,666
Brilliant Central	29,672	31,955	75,000
Brilliant and St. George	26,096	17,884	65,800
Day Dawn Block & Wyndham	37,590	23,811	50,000
Victoria & Caledonia Block	6,687	12,665	30,000

Gympie has had a record year, the production being 140,776 tons, the yield 140,510 oz., the dividends £263,874, and calls £76,590. The main dividend payers are: South Great Eastern, £99,000; South Glanmire and Monkland, £79,500; Scottish Gympie, £50,250.

The world-wide knowledge concerning the intersection of the black slates and auriferous quartz has been amply confirmed by the year's work. The West of Scotland Mine has sunk a prospecting shaft 3,000 ft., but is now in conglomerate, no reef being found in the black slate passed through at 2,858 ft.

The Ravenswood field, long known for its refractory ores, is steadily increasing its production, 20,000 tons of ore giving 40,969 oz. of fine gold, about one-fourth being obtained from concentrates, and one-eighth by cyanide. Mt. Morgan treated 224,022 tons for 142,826 oz. fine gold; the same plant being used as previously described. The whole of the gold is dissolved by chlorine water and precipitated on charcoal.

Many extensive fields are barely explored and will be large producers when better communication is established and cheaper and more effective metallurgical methods adopted.

The results from Woodlark Island, near New Guinea, did not justify the expectations of 1901.

NEW SOUTH WALES.

By favor of Edward F. Pittman, Under Secretary for Mines, we find the total quantity of gold produced to the end of 1902 is estimated at 13,775,922 oz., valued at £50,742,588. The gold produced during the year 1902 was 300,289 oz. crude, equal to 254,435 oz. fine, valued at £1,080,773, as compared with 237,061 oz. crude, equal to 216,888 oz. fine, valued at £921,282 for the previous year; showing an increase of £159,491. This is considered to be wholly due to the augmented production accountable to the smelting companies which have extracted the gold from the ores received for treatment from other States, and which has been included in the returns as the actual produce of this State. The gold mining industry has been severely affected by the drought, and many of the mines have been idle from six to nine months of the year. Ground-sluicing has been next to impracticable, but owing to the water-courses having dried up, the miners were enabled to gain access to the river beds. Cobar leads with 26,956 oz.; Wyalong reports 20,718 oz.; Adelong, 14,414 oz., and Araluen, 13,909 oz. The gold obtained by dredges during the year amounted to 25,473 oz., valued at £97,891, an increase of 1,888 oz., and £8,263 in value, as compared with 1901. The gold was won with 22 bucket and 7 suction dredges. The Araluen Division contributed 52 per cent of the total yield; most of the dredges in this division have had a satisfactory year. At the close of 1902 there were 35 plants in commission, valued at £262,700, while five others, which had been removed from tenantable areas, were in course of re-erection on fresh sites. In addition to gold, 108.5 tons of tin ore were won by the dredges, valued at £8,231.

NEW ZEALAND.

The official gold returns for 1902 are 508,045 oz., valued at £1,951,433, as against 455,561 oz., valued at £1,753,783 for 1901. The West Coast gave 118,796 oz. valued at £475,272, and the Otago District, mainly from dredging operations, returned 181,116 oz., valued at £728,124. The Auckland District, including the Waihi Mine, returned 201,583 oz., valued at £721,977. The Waihi Mine itself treated 159,325 tons of ore, returning £165,000 in dividends. Dredging is on the increase. On the West Coast 183 are working, 59 are building and 52 are being removed; a total of 224. Direct employment is given to 2,000 persons working on these dredges. The improvements introduced are: The use of water power, where available for working the plants; the elevation of tailings by centrifugal appliances instead of ladder elevators; and new devices for catching fine gold. Precautions are taken to prevent the destruction of river flats and choking of channels operated on.

TASMANIA.

The output of gold for 1902 was 70,996 oz. fine, valued at £301,573, against 68,779 oz., valued at £292,155, for the year 1901. Included in this return is the gold from Mt. Lyell amounting to 21,451 oz. fine, this being contained in the 9,608 tons of copper produced. This copper also contains fine silver to the amount of 678,654 oz. The vast body of Mt. Lyell pyrites carries gold to the extent of 0.06 to 0.07 oz. per ton, the gold content being independent of copper values. The siliceous ores on the field have only about one-third of these values. The complex mineral deposits in the neighborhood of Zeehan are also auriferous, the gold being associated with blende. The Hercules and Mt. Reid mines have large bodies of blende with values up to 0.5 oz. gold per ton. The best of this material is mixed with other local ores and smelted at the Tasmania Company's works. The adoption of the Huntingdon-Heberlein process has enabled the company to deal with galena rich in blende. The Tasmania Company increased its crushing plant to 100 stamps, and opened out on the reef at 1,000 ft. Good ore was struck, but an inburst of water seriously interfered with the working of the mine. It has been proposed to increase the pumping plant so as to be able to raise 8,000,000 gals. of water per day from the 1,000-ft. level. Since its formation the company has crushed 463,905 tons, yielding 569,860 oz., value £2,016,314; dividends paid £7639,071. The Lefroy field has not been successful for the year. The gold in the reefs at the upper levels suddenly vanished when a new set of strata was entered and, although the reef at the New Pinafore has been followed and prospected to a great depth, nothing payable was discovered.

At Mathinna the New Golden Gate Mine is opened up at the 1,500 and 1,600-ft. level, a payable shoot 500 ft. long, averaging 17 dwt. per ton, has been proved at the lower levels. The stone is free-milling; 202,261 tons from the mine produced 188,739 oz., valued at £697,502, of which £320,000 has been paid in dividends.

SOUTH AUSTRALIA.

The official gold returns of South Australia were 7,245 oz., valued at £24,878; and for the Northern Territory 20,968 oz., valued at £70,251, or 28,213 crude oz. valued at £95,129. The yield for the year 1901 was 21,939 fine oz. From somewhat exaggerated reports, many miners have been attracted to Arltunga in central Australia, and the latter end of the year being favorable, because rains have fallen, the district will be well prospected.

AN ENGLISH ORE-CARRIER.

A new steamer, recently built in England to carry iron ore from Swedish and Norwegian ports to Rotterdam, is described in the London *Iron and Coal Trades Review* for March 22. The paper referred to remarks that this steamer will probably work a revolution in the method of handling ore, or similar freights, as she can discharge her cargo of ore in 30 hours, whereas, under the old plan of unloading through two hatchways, nearly a fortnight would be required. This steamer—the *Grangesberg*—is 440 ft. long, 62 ft. beam and 29 ft. deep. It is expected that she will carry 10,300 tons of ore on a draft of 23 ft.

The vessel is divided by bulkheads into 24 compartments. She is provided with 14 masts ranged in two lines on each side of the hatchways. There is one hatchway to each compartment. Each of the masts, except the pairs at the extreme ends, carries two derricks, and to each mast of the end pair is fixed one derrick. There are thus 24 derricks, one for each compartment. This, the *Review* remarks, has proved a much quicker method than the present practice, whereby only two derricks are able to work upon a whole cargo. This will furnish some amusement to some of our ore shippers. The vessel seems to be rather lightly provided with power, the engines being estimated at 2,200 h.p. The contract speed is 10 knots an hour, when fully loaded. The engines and boilers are placed far aft, so as to leave the rest of the ship entirely clear for cargo.

THE RARUS-PENNSYLVANIA CASE AGAIN.

By R. W. RAYMOND.

I have received from an intelligent correspondent in Mexico an inquiry and criticism concerning my recent article on "The Latest Montana Decision," the essential portions of which I quote, as follows:

"Referring to the plan which accompanies your article, as I understand it, the Johnstown owners deeded to the Montana Ore Purchasing Company the piece of ground A B C D E F, with all the rights which it might possess. Was it entitled to extra-lateral rights?

"The plaintiff claims rights to the line E F and its continuation, which line appears to be not parallel with any other line bounding the ground as deeded. Would it not be good law, then, to allow to the Johnstown (it being the prior location and having parallel end lines), even more than the decision allows, to wit: To follow the three veins on their strikes and dips to the points where they cross the line E F, bounded by vertical planes drawn through these points parallel to the end lines B' B"?

"The grantors conveyed all the rights possessed by the piece of ground at the time of the conveyance; but could they be expected to convey rights which it did not possess, but which it might derive by the acquisition of any ground in the future, by which their claim was made to conform to the requirements for the possession of extra-lateral rights?"

In reply to these inquiries, I will first quote the pertinent portion of the text of the deed in question. I did not possess this when I wrote the article mentioned, but have obtained it since.

The deed conveys, in the usual form, all the "right, title and interest, estate, claims and demand of the said parties of the first part of, in and to that certain portion, claim and mining right on that certain ledge, vein, lode or deposit of quartz and other rock in place, containing precious metals of gold, silver, and other metal, and situated. . . ."

Here follows a description of the surface-tract by metes and bounds, concluding with a statement of the area, as 6.86 acres, after which occur the following paragraphs, constituting a part of the grant:

"All right, title and interest that is now possessed, together with any that may hereafter accrue through Application No. 1,265, made to the United States Government by the grantors herein for a patent for Lot No. 173.

"Together with all the dips, spurs and angles, and also all the metals, ore, gold, silver and metal-bearing quartz rock and earth therein, and all the rights, privileges and appurtenances and franchises thereto incident, attendant and appurtenant, or therewith usually had and enjoyed.

"And also all the estate, right, title, interest, possession, claim and demand whatsoever of the said parties of the first part in or to the premises, and every part and parcel thereof.

"To have and to hold all and singular the premises with the appurtenances and privileges thereto incident, unto the said parties of the second part."

The superabundant verbiage of these provisions is simply the result of a desire on the part of lawyers drawing conveyances of real estate to avoid any subsequent questions or doubts of construction arising from the rulings of courts as to the precise meaning of this or that phrase or term. The outcome of long experience has been that in States which have not, by the adoption of definite codes of procedure, prescribed simple forms of conveyance, with fixed meanings, lawyers are accustomed to put in everything that has ever been used for that purpose, with the feeling that one term may make good the deficiency of another, and that, where there is no intention to reserve anything, a few extra words, even though superfluous, will do no harm. We may, therefore, dismiss all question of the separate and different meaning of such terms as "right," "title," "interest," "estate," "possession," "claim," "demand," "rights," privileges," "appurtenances," "franchises," "attendant," "incident," "usually had and enjoyed," "dips," "spurs," "angles," etc., etc. I think it is clear enough, through all this traditional verbosity, that the intention of the grantors was to convey everything which they possessed actually or potentially, by virtue of their title to the premises described.

My answer to the letter above quoted is therefore:

a. The piece of ground conveyed by this deed had, at the date of the conveyance, no extra-lateral rights, because such rights accrue only under a specific location, according to certain rules, under the United States law, and no such specific location of this described tract had been made.

b. But the possession of this tract as part of a larger tract, which had been located under the said law as a mining claim, unquestionably carried with it certain extra-lateral rights, which the locators of the larger tract would not have possessed, if they had not held, by possessory title under the law, the smaller included tract conveyed by this deed.

c. These extra-lateral rights originate not in the United States patent, but in the original location. If that location was validly made, and had been maintained up to the date of this deed, in accordance with certain regulations, local or Federal, as to marking of boundaries, annual work, etc., the extra-lateral right under it at that time was as good as it could ever be made by subsequent patent. In fact, the proceedings for United States patent, and the issue of the patent itself, do nothing more than ascertain and certify the rights already possessed by the locator, and release him from certain conditions upon which his possessory title depended.

d. The deed, however, does actually convey, as the above quotation shows, all rights that might accrue through the pending application for United States patent. Such a conveyance the grantors were unquestionably competent to make, although, in my opinion, the said rights (extra-lateral or other) already belonged *prima facie* to them as locators, and were completely conveyed by other clauses in the deed. At all events, we need not discuss that question further. If, in subsequent proceedings for United States patent, anything additional was acquired by the grantors by reason of their ownership of the granted tract, such additional thing they conveyed beforehand by the deed, and that conveyance was perfectly good.

e. This raises, however, another question. If A applies for patent upon a described location, a part of the surface of which is covered by an alleged prior location of B, and A *buys off* B, paying him either in money or by deed before, or promise to give deed after, the issue of patent, the purpose being that B shall not interfere by adverse proceedings with the progress of A's application for patent, can A rightfully then proceed to take patent for the whole tract covered by his location, swearing that he is the rightful possessory owner of the whole, and making no reference to the (alleged or acknowledged) prior claim of B to a part of it?

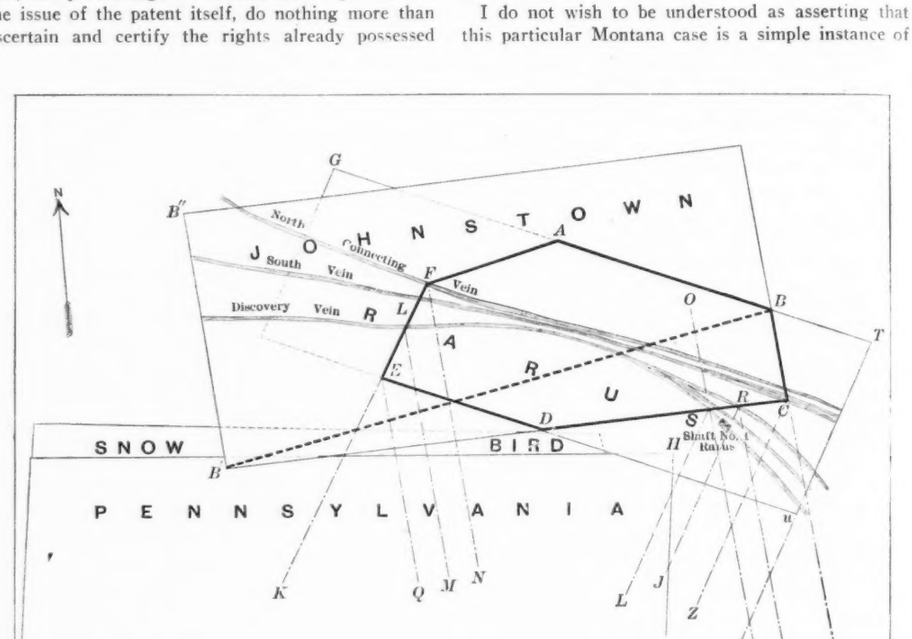


DIAGRAM 1

The point has been urged, in cases which I will not now stop to cite, that such a bargain is an agreement to commit a fraud by the suppression of an essential fact as to the possessory title. But the courts have held (very properly, as I think) that an agreement of this kind is both lawful and laudable, as tending to diminish and simplify litigation, and as wronging no party whatever, not even the United States.

A brief analysis will show the soundness of this conclusion. Such a conflict as to possessory title prior to the issue of patent rests on the priority of location and the maintenance of location-rights up to date, under local, State and Federal regulations. In the assumed case, A's title to his whole location would be complete but for B's adverse claim. But B's claim is likewise only possessory, and can be abandoned by him at any time. If he chooses (with or without being paid for so choosing) to abandon it, and there are no other claimants to the ground, A's title becomes as good to the whole of his location as if B had never existed.

I do not wish to be understood as asserting that this particular Montana case is a simple instance of such an agreement. I do not know whether it is or not; but the deed, the dates and the court's decision are not inconsistent with that assumption, and, moreover, it is on that assumption that the question involved is worth any argument at all, as likely to throw light upon the United States mining law and its application to other cases.

I assume, therefore (for the purpose of such a study of principles, and not as an expression of my opinion on this case), that A was applying for United States patent on the Johnstown location; that B commenced, or threatened to commence, adverse proceedings based on an alleged superior possessory mining-title to certain ground within that location; that, in order to avoid the delay and expense of a lawsuit over B's adverse claim, and possibly of a consequent amendment or recommencement of the application for United States patent, A paid B to remain silent, and let his adverse claim lapse by default, as explicitly provided by the United States statutes, so that A could proceed and acquire patent as the undisputed possessory owner of the Johnstown claim; that the price paid to B for this legal abandonment of his conflicting claim was the conveyance to him of a certain tract (possibly, though not necessarily, all that he alleged to be covered by his own adverse claim) together with all the rights, extra-lateral or otherwise, actual or potential appertaining thereto. As I have already shown, such an agreement is perfectly proper. There is no de-

cent reason for condemning or annulling it. The only doubtful question is, What do the parties give and get under it?

f. Under such an agreement, when the consideration is a deed of mining-ground, I think it fair to hold (in the absence of any explicit statement of other consideration) that A gets the advantage of uninterrupted proceedings for United States mining-patent, and the issue thereof to him, as the undisputed owner of his entire location; and that B gets, without any of the expense or trouble involved in an adverse proceeding in court, the surface granted by A, with all the extra-lateral and other rights, already held or to be acquired by A in consequence of the undisputed possessory title thereto.

On the other hand, by the legal abandonment, through failure of assertion of his alleged superior claim, B definitely and finally surrenders all rights based on that claim as appurtenant to any location of his own covering the tract deeded to him by A. Whatever rights B may thereafter hold in connection with that tract must come from A as grantor, not from any prior claim of his own.

g. Now A cannot be held to have granted, in this case, more than the rights actual or potential, pertaining to the tract described. I mention this point, because the deed, as quoted above, seems to convey all rights, etc., that may accrue through the application for the Johnstown patent. But this is no doubt to be construed as limited to the rights accruing under that proceeding by virtue of A's established ownership of the described tract.

h. Now what were those rights? Manifestly, in my judgment, they comprise exactly what A has acquired by the ownership of the tract—namely, the intra-lateral and extra-lateral rights upon all veins apexing within the tract, to the extent, longitudinally, of their apexes within the tract, and between end-boundaries formed by vertical planes, parallel to A's outside end-lines (not necessarily to any boundary lines of the interior tract) drawn for each vein through the points where its apex enters and leaves the tract granted.

COAL IN JAVA.—Imports of coal into Java are reported, by the British Consul at Batavia, at 191,128 metric tons in 1902. This is a decrease of 9,515 tons from the preceding year.

MINING MACHINERY EXPORTS OF GREAT BRITAIN.—Exports of mining machinery from Great Britain for the four months ending April 30 were valued as follows:

	1902.	1903.	Changes.
United States	£215	£208	D. £7
South America	9,833	8,643	D. 1,190
Europe	13,931	10,071	D. 3,860
South Africa	72,158	97,339	I. 25,181
East Indies	17,743	23,358	I. 5,615
Australia	34,311	24,831	D. 9,480
Other countries	34,386	63,397	I. 29,011
Totals	£182,577	£227,847	I. £45,270

The increase to South Africa was large, and there was also a considerable gain in shipments to the East Indies. Those to Australia show a large decrease.

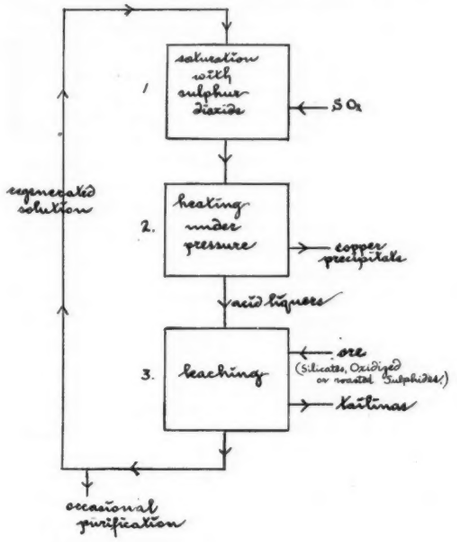
GOLD-DREDGING IN BORNEO.—A New Zealand engineer, who recently visited Borneo, gives the following notes to a New Zealand paper: "In Western Borneo, on the Melawi River, there is a bucket dredge working. It had just started, and the value of the ground had not been ascertained. Further up the coast from Pontianak, at Sinkawang, a pump dredge had also just started. Going into the interior from there to look at some alluvial areas I found them too shallow for dredging, but they afforded splendid chances for sluicing. The Dyaks here have been working for alluvial gold for years, but their methods are crude and desultory in the extreme. In Western Borneo, according to the Dutch law, the Chinese command the flats, and the Dyaks the hillsides. I went on to Sambas, and on the Tereja River I saw a suction pump dredge. It was a failure. About £50,000 had been spent on it, and it had put about one ton of wash over the tables."

A PROPOSED PROCESS FOR EXTRACTING COPPER FROM LOW GRADE ORES.

By G. D. Van Arsdale.

The following notes represent the results of a quantity of work on some reactions in which sulphur dioxide is used as a precipitant of copper from sulphate solutions, and as a means of producing sulphuric acid for leaching, and since they are necessarily incomplete, no work having as yet been done outside of the laboratory, they are presented simply in the form of a preliminary notice.

It was found in the course of some experiments by the writer, that sulphur dioxide, under proper conditions, was capable of precipitating copper from solutions of cupric sulphate, and also producing free sulphuric acid. There are a number of equations which can be written to explain the above reaction, and there are also probably several side reactions which take place, but I believe the following to be correct for the main reactions, which result under proper conditions in the precipitation of metallic copper and free sulphuric acid in excess of that required to redissolve the amount of copper precipitated.



I. $3CuSO_4 + 3SO_2 + 4H_2O = Cu_2SO_3\,CuSO_3$ (cupro-cupric sulphite) $+ 4H_2SO_4$

This sulphite precipitate then usually reacts further with the free acid formed, thus,

II. $Cu_2SO_3\,CuSO_3 + 4H_2SO_4 = Cu + 2CuSO_4 + 2H_2SO_4 + 2SO_2 + 2H_2O$

At atmospheric pressure and in the cold, a solution of cupric sulphate saturated with sulphur dioxide, after standing for some time, deposits a small amount of cupro-cupric sulphite. On heating such a solution to boiling and at the same time passing sulphur dioxide through it, a larger amount of copper is precipitated, resulting finally in a precipitate of metallic copper according to equation II above. When the solution, however, is saturated with sulphur dioxide and placed in a closed vessel and heated under pressure, the yield of precipitated copper is increased to between 40 and 50 per cent of the copper originally present, and free acid is formed according to the above equations.

It was thought that the above might serve as a basis for a process for extracting copper from low-grade ores, and tests on a laboratory scale made for a considerable time, have given very good results.

A diagrammatic representation of the process, and a description of the same applied in practice, is given above.

It will be seen that the process has three stages—saturation of the solution of cupric sulphate with gas, heating the saturated solution under pressure, and leaching with the acid liquor resulting from the precipitation, the last operation resulting in the practical regeneration of the original solution.

The first operation may be carried out by passing gases containing sulphur dioxide up through a suitable tower, packed with a proper material, such as coke, and at the same time allowing the solution to drain through from the top and collecting it at the bottom. It is evident that, as it is only necessary to have the sulphur dioxide dissolve, dilute gases may be used, and it is proposed to use converter flue gases for this operation, but where sulphide ores are available, these will furnish a cheap and sufficient source of supply of the only reagent necessary.

The degrees of heat and pressure required for the second operation are not high, it being only necessary to heat the saturated solution nearly to 100° C., the pressure produced being about 30 lb. to the square inch. A lead-lined steel tank, similar to the standard chlorination barrel, can be used for this purpose, and the heating probably best done by steam, although direct heat can possibly be used in a suitably constructed apparatus.

The reaction takes place at below 100° C., so that it is unnecessary to heat above this temperature. The pressure required is produced by the expansion of the dissolved gas, and it is sufficient to heat to the proper degree and maintain there only a short time for completion of the reaction.

The reason why complete precipitation of the copper does not take place is probably the fact that the acid formed inhibits further action at about a point equivalent to a precipitation of between 40 and 50 per cent of the total copper, using a solution containing 10 per cent copper sulphate originally.

It is not necessary to precipitate all of the copper as the solutions are to be used again, but in case this is desirable, it can be done by neutralizing the acid solution, again saturating with gas and heating, leaving this time 25 per cent of the original copper remaining in solution.

This re-heating can be repeated as often as necessary or desirable, and the liquors finally freed from the last traces of copper by passing them over scrap iron. It will also probably be best to free the weaker wash waters from copper by passing them also over scrap iron.

The precipitated copper, if pure, as will be usually the case, requires to be simply melted and cast. If, however, it contains co-precipitated salts of iron or other impurities which gradually accumulate in solution, it may be smelted as part of a furnace charge. It is better, however, when the amount of these impurities becomes excessive, to purify the solutions, which can be done according to the reactions made use of in Hofman's method for making blue vitriol. This requires simply heating the solution, which should be kept neutral, and injecting air, whereupon all of the iron, if necessary, may be precipitated, carrying down also all the arsenic and other impurities present in the solution. It is not necessary to precipitate all of the iron, as quantities equaling the amount of copper present do not interfere with the reactions.

The leaching will not differ from standard practice, except that a careful washing of the tailings will be necessary. As seen from the above equations, an excess of acid is produced over that necessary to regenerate the original solutions, and this will, in most cases, be neutralized by the acid consuming constituents other than copper, contained in many ores. In case there is free acid remaining after leaching, it is better to neutralize this, which can be easily done.

It is also necessary, for several reasons, to have no sulphur dioxide in the solution used for leaching, and this can be nearly freed from the gas by simply releasing the pressure in the tank after precipitation of the copper, and while the liquor is still hot. The solubility of sulphur dioxide is very low at 100° C., but in case any gas remains, this can be removed by heating the solution for a short time with a steam injector.

It is, of course, desirable to utilize the heat remaining after completion of the second operation, and the liquors are therefore to be used for leaching while still hot, whereby a considerably accelerated extraction will be obtained.

No costs of operation have as yet been obtained,

as no test on a working scale has been made; but it is probable that a test on a large scale will be made in the near future, from which costs and other information will be obtained.

THE DEPARTMENT OF COMMERCE.

In accordance with a provision of the Act establishing the Department of Commerce and Labor, Secretary Cortelyou, of that Department, has appointed a Commission to investigate and report what re-arrangement of the statistical work of the various bureaus composing the Department is advisable in order to avoid duplication in work. The Commission consists of Messrs. Carroll D. Wright, Commissioner of Labor, chairman; S. N. D. North, of the Census Office, vice-chairman; James R. Garfield, Commissioner of Corporations; O. H. Tittmann, Superintendent of the Coast and Geodetic Survey; George H. Bowers, Commissioner of Fish and Fisheries; F. P. Sargent, Commissioner of Immigration; O. P. Austin, Chief of the Bureau of Statistics, and Mr. Frank H. Hitchcock, Chief Clerk of the Department of Commerce and Labor, secretary. This Commission will investigate what re-arrangement by transfer or otherwise in the work now assigned by law to the statistical bureaus and offices will result in improving the service; what field work, if any, now being conducted, or what reports, if any, now being published, can be consolidated or dispensed with with a view to eliminating any duplication of work done by the different bureaus; and to define clearly the field and functions of each bureau or office; and generally to make such recommendations as commend themselves for the orderly and scientific readjustment of the several bureaus and offices of the Department. If possible a report is desired by July 1 next, when the various bureaus become parts of the new Department, and the Commission is authorized to report from time to time on different points as they arise.

ANALYSIS OF CRUDE SULPHUR.—Mr. Frank B. Carpenter, in the *Journal* of the Society of Chemical Industry (21-832) says that in some crude Mexican sulphur only a part of the sulphur was soluble in carbon bisulphide and the ignition method could not be used on account of the presence of calcium sulphate containing water of crystallization. As this water was gradually given off at 100° C. the moisture was determined by drying in a vacuum over sulphuric acid. The substance was then boiled with dilute hydrochloric acid, filtered in a Gooch crucible, dried and weighed. This removed the calcium sulphate; the sulphur in the residue was found to be readily soluble in carbon bisulphide.

CASTING COPPER IN SAND.—According to Dr. J. W. Richards, in the *Metal Industry*, if the copper has overheated, it often explodes as it sets, and no good castings are produced. If it is cast without being overheated, liquid copper oozes from the gate for some time during setting, while the casting is full of blow-holes, caused by carbonic oxide. Phosphorus can absorb the oxygen present in the metal as cuprous oxide, but not that as carbonic oxide. Silicon can do both. One pound of silicon-copper containing 10 per cent of silicon is added to 100 lbs. of copper, introducing 0.1 per cent of silicon. This amount suffices, if the copper is kept well-covered with charcoal and not overheated. A plumbago stirrer is used for mixing the bath, and time is given for the silica formed to rise to the surface. The metal is then skimmed and poured. The silicon may be doubled, if high electrical conductivity of the castings is not a prime desideratum. The precautions to take are summarized as: 1. Use a clean crucible and keep it for this work. 2. Use graphite stirrers and skimmers; iron is rapidly attacked by silicon. 3. Keep metal well covered with charcoal. 4. Do not overheat. 5. Stir and give time for silica to rise. 6. Cast pattern with finished side down, avoiding blow-holes in it, which rise to the upper surface. 7. Do not pour too cold. 8. Silicon will not make up for carelessness in handling the metal.

OBSERVATIONS ON GOLD DEPOSITS.

By CHESTER WELLS PURINGTON.

The distribution of ore deposits is a subject which presents to the mining engineer more of practical importance than does the discussion of the origin of ores. While not decrying the usefulness of the several views which are now the focus of so much comment among geologists, I would urge the necessity for collecting and publishing more data concerning the distribution of ores, together with their accompanying phenomena. In the present paper the purpose is to treat of the distribution and rock association of some gold deposits, the cases dealt with being for the most part those which have come under my personal observation. Although it is recognized that the recording of such observations forms but an elementary part in the working out of the profound science of ore deposits, it is hoped that some shreds of value may be found among these notes by those who shall later compile lists of the known gold occurrences.

In recent years, the accurate work which has been performed with reference to the testing of rock and rock areas, remote from metalliferous veins, has given convincing illustration of how widespread is the distribution of gold. Since the researches of Sandberger, no more able work has been done in the line of determining the minute quantities of gold and silver than that of Mr. Luther Wagoner,[1] whose results have recently been published. Mr. Wagoner has shown that granite, syenite, basalt and diabase, of the igneous rocks, and such material as Carrara marble and San Francisco Bay mud, representing sediments, contain gold in appreciable quantities. His specimens were selected without reference to the distribution of metalliferous provinces, and the work has thus a special value. It is possible that further investigation along the line of these experiments may show that the distribution of gold is practically universal.

Mr. T. A. Rickard, in one of his recent contributions[2] to the *Transactions* of the American Institute of Mining Engineers, states that the late Prof. Posepny criticized him for looking at every new conception in ore-deposition "from the sole standpoint of its immediate usefulness in mining." Mr. Rickard says that in the main he accepts the impeachment. One might almost go farther than this to-day and say that the writer on ore-deposits must confine himself to noting and speculating on those which have economic importance, or the mass of literature will soon become overwhelming. In the following notes, therefore, those occurrences of gold which have proven, or under future conditions may prove, of mining value, are referred to. Digressions are made from this general rule of treatment only in cases where the gold deposit of purely scientific interest offers special features for comparison with workable ore-bodies.

From the standpoint of personal observation, the recent paper of Mr. J. E. Spurr[3] has a special importance, and portions of it are to be considered as a distinct contribution to the assembly of information concerning ore-deposits. Mr. Spurr has in this paper elaborated the theory advanced by him to account for certain of the gold veins of the Yukon District in Alaska,[4] and has cited numerous occurrences from other parts of the world in support of his hypothesis. As I understand Mr. Spurr he believes that the siliceous *relique* of large igneous magmas, as exemplified in the consolidated portions now visible at the earth surface, is more prevalent than has generally been called attention to. Further, he maintains that in any large area of rocks, which are characterized by the occurrence of metalliferous deposits, the distribution of the gold-bearing veins is connected with the granitic or siliceous, rather than with the more basic or iron-bearing portions of the mass. Instead of stopping with a granite as the final phase of a cooling and crystallizing magma, or with those forms of effusive lava, which are the surface equivalents of granite, he goes farther. He says that certain portions of the cooling mass may, if they find a sufficient opening, take the form of very siliceous dikes, which by the disappearance of the biotite, and the almost complete obliteration of the feldspar, become what he has called "alaskite." That further, by the disappearance of the feldspar, these alaskites may and do pass into quartz veins, containing precious metals as a direct product from the cooling magma, and among these metals notably gold. In other words, he traces the origin of certain quartz veins directly from igneous magmas, by a process of magmatic segregation, and derives an auriferous quartz vein from an igneous siliceous dike.

Since the time of Hutton's observations on igneous rocks, and the experiments of Sir James Hall in the latter part of the eighteenth century, various writers have held to the igneous theory of veins. J. Brough Smyth[5] quotes, with a considerable amount of favorable comment, a work by Thomas Belt,[6] in which an igneous theory to account for the origin of auriferous quartz veins is given with such compactness that I venture to insert it here. After making the general statement that veins are explained by the theory that they are fissures which have been filled with molten silica containing entangled metallic vapors, he goes on to say that "the fusion of rocks in the bowels of the earth, and their subsequent consolidation supply the requisite conditions for the rending open of the superincumbent rocks, and the filling of the rents so formed with fluid matter, varying in composition according to the comparative depth from which it has been projected."

Although the ideas of the earlier investigators were to a considerable degree speculative, and in many cases not supported by the detailed observations which render the theories of present writers worthy of attention, still a consideration of Mr. Spurr's theory should include at least a mention of previously advanced theories which present analogous features.

Mr. E. D. Levat[7] has called attention to gold occurrences in East Siberia, which are apparently comparable to some extent with those which Mr. Spurr has found on the Yukon. I have not seen the East Siberian deposits, but shall beg indulgence to refer to them before proceeding to the description of localities personally visited. The descriptions given are evidently the result of much patient investigation on the part of the French engineer.

On a tributary of the Onon River, namely, the Khangatok Creek, in the Trans-Baikal region to the southeast of Irkutsk, on the border between Siberia and Mongolia, is situated the Blagovieshensk placer. This mine produced, in the years from 1868 to 1879, 491 poods, or over 8,000 kilograms, of alluvial gold. The gravel contains 0.25 per cent of iron pyrite, which on being assayed was found to carry $40 to the ton in gold. The bedrock is a clay schist lying between two masses of granite on the east and west. The two granite masses are connected by a dike of aplite, according to Mr. Levat. He explains the occurrence of this rich placer from the erosion of the aplite, which contains the gold. He gives it as his opinion that the aplite was mineralized by a process contemporaneous with the disappearance of the mica from the igneous rock, and defines the aplite as a granite without mica.

In an entirely different locality, that of the Zeya River, a northern tributary of the Amoor River, Levat states his inability to find auriferous veins or

[1] Luther Wagoner, "The Detection and Estimation of Small Quantities of Gold and Silver." *Transactions* American Institute of Mining Engineers, 1901, p. 798.
[2] T. A. Rickard, "The Formation of Bonanzas in the Upper Portions of Gold Veins." *Transactions* American Institute of Mining Engineers, 1901, p. 199.
[3] J. E. Spurr, "A Consideration of the Igneous Rocks and their segregation or Differentiation as related to the Occurrence of Ores." *Transactions* American Institute of Mining Engineers, New York Meeting, 1902.
[4] J. E. Spurr, "Geology of the Yukon Gold Belt." 18th Annual Report United States Geological Survey, part 3, p. 300.
[5] J. Brough Smyth, "Gold Fields and Mineral Districts of Victoria," 1869, p. 236.
[6] Mineral Veins—An Enquiry into their Origin—Founded on a Study of the Auriferous Quartz Veins of Victoria, by Thomas Belt.
[7] E. D. Levat, "L'Or en Siberie Oriental," Paris, 1897.

other primary deposits to account for the existence of the rich placers there exploited. The country is for the most part schist and gneiss in which beds of quartz are interstratified. There is a separate large detached mass of fine grained granite. In this granite, entirely apart from any other rock, occurs the placer deposit forming the Zholon Mine, one of the richest in the district. It is situated on the Zholon Creek, a tributary of the Zeya. In a length of 2.5 miles along this creek more than $7,500,000 in placer gold have been extracted.[8] The gold is not greatly worn, and is of moderate fineness of grain. The granite is characterized, especially in certain areas, by a schistosity, running nearly north and south, the minute planes being filled with a heavy iron oxide. No quartz is found, and there are no other signs of mineralization. No other rock occurs in the vicinity. The granite on assay yielded, even in its best mineralized portions, less than $1 to the metric ton in gold.

The above cases are cited as illustrations of the apparent direct connection of gold with granitic rocks in origin. One can hardly question, after seeing such instances in the field as Mr. Spurr and Mr. Levat call attention to, that there exists a genetic connection between siliceous rocks and gold, at least in some well-defined instances. Whether this connection of gold with siliceous provinces is of such general occurrence as Mr. Spurr believes, is a matter subject to some doubt, and worthy of investigation.

That rocks of a moderately siliceous character form a habitat for gold-bearing veins has frequently been remarked. So long ago as 1845 Mr. P. Tchihatchef[9] called attention to the fact that the occurrence of diorite is favorable to the occurrence of gold, and gave numerous citations from various parts of the world in support of this view. In 1866 Mr. P. P. Doroschin[10] advanced practically the same opinion. Undoubtedly the association is of very frequent manifestation. I am unable to believe, however, that either diorite or granite, in single occurrence, without the accompanying presence of the more basic rocks, are generally favorable to the segregation and subsequent deposition of gold

That a very large proportion of the known occurrences of gold are directly associated with silica in the form of quartz must be admitted. Until within very recently some investigators have claimed that an original deposit of gold without quartz was an unobserved phenomenon. Mr. Spurr, as I understand him, maintains that the derivation of a gold-bearing vein uninterruptedly from a siliceous rock is not only a possibility, but is a plausible explanation for many of the occurrences in nature. He eliminates the break in the continuity of phenomena which is a necessary accompaniment to the formation of a vein in a previously existing fissure. Without taking up here the various definitions of a vein which have been advanced, I would suggest that Mr. Spurr has rather overlooked the physical side of the question, in his desire to lay stress on the chemical activity involved. If the occurrences to which he draws attention are quartz segregations, even though they contain sulphides of the metals, and are payably auriferous, they constitute a very exceptional class of veins, according to my understanding of the term. Indeed, I question if they should be classed as veins at all. I would therefore object to Mr. Spurr's views, as set forth, from two standpoints, one main, one subordinate. From the main standpoint that siliceous rocks without the accompanying association of basic rocks are not, in the majority of observed cases, favorable to the occurrence of gold; and from the subordinate standpoint that fissure-veins formed by siliceous segregation in granitic magmas are difficult to conceive of from a purely physical standpoint.

The better to illustrate my meaning as regards the word vein, I cite from recent geological literature. Prof. J. F. Kemp, in his generally clear and useful paper,[11] "The Role of the Igneous Rocks in the Formation of Veins," appears to me to use the term vein in an ambiguous sense, in his description of pegmatitic occurrences. Referring to certain cases in Connecticut, he says, "Pegmatites grade insensibly into quartz-veins." Such a phenomenon, except in a very limited sense, is hard to reconcile with the accepted definition of a fissure-vein. Pegmatite deposits undoubtedly occur with well defined walls. I am informed by Mr. Philip Argall that dikes of pegmatite, exhibiting sharp walls, occur well-defined in the granites of Gilpin and Clear Creek counties, Colorado. In a recent paper on the occurrence of mica in Brazil,[12], Mr. H. Kilburn Scott says, "The principal mica deposits are pegmatite veins, lenses or dikes, which occur in the metamorphic schists," etc., and states that the veins, running parallel to one another, from 20 ins. to 10 ft. in width, may be traced for long distances. Masses or bosses of quartz occur in the midst of these pegmatite veins. While granting the existence of pegmatite veins of considerable length and clear-cut definition, I maintain that they are exceptional, and that the normal pegmatite occurrence exhibits the characteristic features of a segregation from the enclosing mass, its structure grading into that of the containing granite by a finer and finer crystallization.

For example, at the well-known tourmaline deposit of Paris, Maine, the occurrence is a pegmatitic segregation in granite. The mass lies in the granite with no well-defined boundries. It could not be defined as a vein or dike. The gangue minerals common to quartz veins occur in it, exhibiting many of the features of arrangement characteristic of such veins. Quartz crystals, arranged in comb-structure, and with open druses, even metallic sulphides, occur. I see no reason to doubt that the presence of gold in minute quantities might be established. In the midst of the Paris deposit occur many secondary and tertiary fractures, which appear to have been filled and refilled with quartz crystals. Some of these veinlets penetrate even the big crystals of black tourmaline, which I have seen 15 ins. in length, and 4 ins. in diameter. But taken as a whole, the occurrence is no more a vein than are the elongated blebs of magnetite, which compose many of the iron deposits in the gneisses of New Jersey. Veins in an extremely local manifestation are formed as a subordinate phenomenon in connection with pegmatite deposits as illustrated at Paris, fulfilling all the requisite conditions of a pre-existing fissure subsequently filled by extraneous material. They are, however, in the majority of cases, of interrupted continuity, extremely irregular width, and except in rare instances, of negligible importance from a mining standpoint.

(*To be continued.*)

EARLY MINING IN ENGLAND.—The London *Colliery Guardian* says: "In North Staffordshire iron ore was smelted at Uttoxeter early in the thirteenth century, and coal and red ironstone were both dug at Amblecote in the reign of Edward III. A deed of the Heronville family, dated 1315, some lands bequeathed to Johannes de Weddesbyrie, are described as lying at Bradeswall, 'over against the cole pits.' A deed of the Perrye family, dated 1401, mentions a piece of land with 'ye two cole-pits thereon situate, called ye Hollowaye and ye Delves, situate neare Windmill Field in Bylstone.' Some curious particulars of this ancient pit are given in a local history written by G. T. Lawley. It was, he says, worked by William Tomkys. Thomas Jacson and Nycolas Foxhall. Their first shaft was square in shape, supported on the sides by scantling timber. The coal was raised by a common windlass. This pit was worked until the seventeenth century, and was visited by Dr. Plot, the county historian, in the year 1640. In the year 1490, a coal pit was in successful operation at Moorfields, near Wolverhampton."

TREATMENT OF LOW GRADE COPPER ORES.*

BY EDWARD D. PETERS.

In order to narrow the field of inquiry, it may be well to enumerate all the methods that seem to have any claims at all to consideration, in connection with the treatment of the ores in question. We may eliminate all those processes that, on examination, appear economically inapplicable, and consider the few that then remain: (1) Direct smelting (2) mechanical concentration, followed by the smelting of the concentrates and the lixiviation of the tailings; (3) lixiviation of the ore direct, with a solution of ferrous chloride and salt; (4) lixiviation of the ore direct, with hydrochloric and sulphuric acids, which are regenerated in the solution by the precipitation of the copper from a chloride solution by means of sulphurous acid; (5) lixiviation of the ore direct, with sulphuric acid; and (6) the Rio Tinto method of gradual lixiviation in heaps.

1. *Direct Smelting.*—Wherever it is in any way practicable, the American metallurgist prefers smelting to any form of wet process. The perfect continuity of the operation, the ease and simplicity with which the unpulverized ore pursues its steady course from the mine to the blast-furnace, from the blast-furnace to the converter, and from the converter to the refinery, lend themselves to operations on a very large scale, and permit the substitution of mechanical appliances for hand labor to an extent unapproachable in any other method. Another great advantage of smelting is the almost complete recovery of the precious metals present, with but little extra cost.

Nor need we be deterred from the employment of direct smelting, by even a very considerable excess of silica, and a corresponding deficiency of iron in the ore. This was most clearly pointed out by Mr. F. R. Carpenter in the Deadwood & Delaware Smelter in South Dakota. He demonstrated conclusively that highly siliceous ores, containing a little pyrites, and with extremely expensive coke, could be smelted direct in the blast-furnace, with the production of slags containing 50 per cent of silica, 30 per cent of lime and magnesia, and only 16 per cent of ferrous oxide. The lime and magnesia were added to the ore in the form of barren dolomite; 20 to 30 tons of ore produced one ton of matte; the slags were exceedingly clean; and the precious metals and copper (very little) that were contained in the ore, were almost entirely recovered in the matte.

The most interesting features of this unusual type of smelting are the fusibility of the very acid silicate of lime and magnesia with but little iron, and the high rate of matte-concentration. The latter result is due to the very acid slag, which decomposes the pyrites present, carrying their iron-contents into the slag as ferrous oxide. It is not always understood by blast-furnace smelters that, other things being equal, an acid slag means a high-grade matte, while a basic slag is accompanied with a low-grade matte.

The writer has only gone into this detail in regard to the direct smelting of very siliceous ores in the blast-furnace in a raw state, in order to call the attention of metallurgists to possibilities that may solve certain difficult metallurgical problems.

In the case of an absence of silver and gold in the ores, and the non-existence of limestone ores for fluxing purposes, with a high cost for fuel, the metallurgist would be compelled, most reluctantly, to give up the idea of direct smelting.

2. *Mechanical Concentration, Followed by the Smelting of the Concentrates and the Lixiviation of the Tailings.*—The writer has met with, or been cognizant of, so many difficulties and failures in attempting to concentrate low-grade, disseminated sulphide ores of copper, that he has always advised exhaustive mill tests on a large scale before venturing to employ this method. It is only suitable for exceptional ores and conditions.

[8] From 1890-1894 this placer paid $2,000,000 in dividends.
[9] P. Tchihatchef, "Voyage Scientifique dans l'Altai Oriental," Paris, 1845.
[10] Archiv fur wissenschaftliche Kunde in Russland," vol. 25, 1866 (probable reference), work not accessible.

[11] J. F. Kemp, *Transactions*, American Institute of Mining Engineers, xxxi, 1902, p. 183.
[12] H. Kilburn Scott, "On the occurrence of Mica in Brazil and on its preparation for the Market." *Transactions*, Institution of Mining and Metallurgy, April 23, 1903.

* Abstract from a paper and discussion, read before the Institution of Mining Engineers, Newcastle-upon-Tyne, England, May and December, 1902. Dr. Peters' paper is a contribution to the discussion of an article by Mr. J. J. Muir, in which the latter gave results of tests made upon an Australian siliceous copper ore. For the interpolations, given within brackets, the Editor is responsible, and not Dr. Peters. The discussion is reproduced because it concerns a practical subject and gives the views of an authority.

In reference to the results of tests quoted in this discussion by Mr. Muir, it is obvious that the results themselves are stronger arguments against the emploment of this process than any that the writer could advance. (The experiments of Mr. J. J. Muir were made on an Australian ore containing 3.94 per cent copper, 9.55 iron, 50.15 silica, 16.85 alumina and 19.51 per cent of sulphur and alkalis undetermined. A concentration test yielded a product representing 7.277 per cent of the original ore, but the assay gave only 11.12 per cent copper, with 28.40 per cent iron and 14.40 per cent silica. The tailings carried 3.37 per cent copper, so that the recovery was only 81 per cent of the copper contents.[1])

Without attempting to analyze his experiments in detail, the writer would simply point out that the results of Mr. Muir's concentrating tests show a saving in the concentrates amounting to about 20 per cent of the original copper contained in the ore, and a loss of nearly 80 per cent in the tailings. This, of course, means no concentration whatever, and there must be some reason, not apparent to the writer, why Mr. Muir attempted to concentrate at all.

If a portion of the copper in the ore were present in the shape of some mineral that would exercise an injurious effect upon the subsequent lixiviation, and if this mineral had a higher specific gravity than the remainder of the sulphides present, there might be some question of attempting to remove it by concentration. But, as the 20 per cent of the copper that was removed by concentration had, as the writer understands, exactly the same chemical composition as the 80 per cent left in the tailings, he fails to see the use of employing concentration; nor does he believe that these ores should be subjected to concentration. (It will be understood that the writer is referring solely to the ordinary methods of wet-concentration in making this statement, and that he is not expressing any opinion as to the results that might be obtained by one or two novel patented methods of which he has no personal experience.)

It seems to the writer most advantageous, therefore, to subject the entire mass of ore to lixiviation, rather than to complicate matters and increase expenditure by any preliminary concentration.

3. *Lixiviation of the Ore Direct, with a Solution of Ferrous Chloride and Salt (Old Hunt & Douglas Method).*—Considerable quantities of ore have been successfully worked by this process in the United States. The method depends upon the fact that oxide of copper is decomposed by ferrous-chloride solutions, forming insoluble ferric oxide, while the copper goes into solution as cuprous and cupric chlorides. It is precipitated in a very pure metallic form by iron, the ferrous-chloride solution being thus also regenerated, and requiring only the addition of a little salt to fit it for further use. The consumption of metallic iron in this method is very small, since much of the copper is in solution as cuprous chloride.

As the copper must be in an oxidized form, in order to go into solution quickly and thoroughly, the ore will require a preliminary roasting of sufficient thoroughness to convert most of the copper present into oxide or sulphate. This means that the ore must be crushed dry, though not to nearly so fine a state as would be required for its concentration. Therefore, instead of wet crushing followed by concentration, the writer would suggest dry crushing followed by roasting.

It is impossible to make a comparison of the costs of these two different plans of operation without being accurately acquainted with the physical and chemical character of the ore under consideration. By the use of modern high-speed rolls of great diameter and weight, and of the automatic reverberatory roasting-furnaces so generally in use in the United States and elsewhere, the cost of dry-crushing and roasting should not exceed the cost of wet-crushing and concentration, while the condition of the pulp for lixiviation is incomparably better when produced by the former treatment. Apart from the advantage gained by the coarser condition of the pulp, and the much lesser proportion of very fine powder, the ore undergoes a physical change in roasting, which makes it much like sand and gravel, and enables the solutions to permeate it with a completeness and rapidity that are quite surprising. The advantages thus gained will only be fully appreciated by those who have had experience in leaching the same ore both before and after roasting. They are so great that, in several instances in this country, tailings are roasted previous to lixiviation, solely for the purpose of improving their physical condition, and of increasing the thoroughnes and rapidity of the latter operation.

The writer desires to emphasize this dry crushing and roasting as being, in his opinion, the most important step towards a successful leaching of these ores by the methods that he has called Nos. 3, 4 and 5.

4. *Lixiviation of the Ore Direct, with Hydrochloric and Sulphuric Acids, which are Regenerated in the Solution by the Precipitation of the Copper from a Chloride Solution by Means of Sulphurous Acid (New Hunt & Douglas Method).*—By this method, the copper is precipitated from its chloride solution, by means of sulphurous-acid gas, which throws down the copper as a very heavy white cuprous chloride, that settles almost instantaneously. Sulphuric and hydrochloric acids are generated in the solution, which only requires the addition of salt to make it ready for further use.

One great advantage of this method is the rapid dissolving of the oxidized copper present by the strongly acid solution, which even attacks sulphides with consilerable energy. Any lead and silver present remain undissolved. The ores require to be roasted, as in the previous process. A supply of pyrite is essential to the economical working of this method, and, of course, it is very advantageous if these pyritic ores contain some metal of value.

5. *Lixiviation of the Ore Direct, with Sulphuric Acid.*—Mr. Muir has already considered this method in his paper, though he confined it to the treatment of the tailings after concentration.

The writer can only add that, if lixiviation is at all suited to the fine tailings and slimes from the concentrating process, it is still more feasible, and much more economical, when employed upon the coarsely-crushed and roasted ore; and, that instead of taking 11 weeks for the extraction of the copper, it is probable that, with roasted ore, an equally perfect extraction would be accomplished within 2 or 3 days.

(In this connection reference might be made to the process patented by Mr. James W. Neill. Sulphurous acid is used to leach the copper. This method was described in the ENGINEERING AND MINING JOURNAL of May 30, 1901, from which the following is now quoted: The native oxides and carbonates of copper are readily soluble in sulphurous acid with the formation of cuprous sulphite (Cu_2SO_3). This salt is insoluble in water, but soluble in water containing sulphurous acid, from which the copper can be precipitated by driving off the excess of sulphurous acid by heat. The precipitate is cupro-cupric sulphite ($CuSO_3$, $Cu_2SO_3 + 2H_2O$), and contains 49.1 per cent of copper. This salt is a heavy, crystalline compound, of a dark red color, which settles readily from the solution, and can be washed by decantation, dried and reduced to metallic copper by fusing on the hearth of a reverberatory furnace. The process is suitable both for sulphide and oxidized ores, the former being first roasted to expel the sulphur and convert the copper compounds into oxides, as sulphurous acid does not attack sulphides. The ideal ore is one carrying oxides or carbonates of copper in a siliceous gangue; lime and magnesia are objectionable, as they dissolve in sulphurous acid and, while they do not materially interfere with the reactions, they consume a certain amount of sulphur and so increase the cost of the process.

Sulphurous acid produced by roasting pyrite is the cheapest chemical procurable in the western country, and the plant is much simpler than that used in making sulphuric acid. A unit of copper converted into cuprous sulphite requires but half the sulphur that would be required to convert it into cupric sulphate. Cuprous sulphite is precipitated from the solution without the use of scrap iron, which is a great advantage in remote districts. In Southern Utah, for instance, scrap would cost from $40 to $50 per ton, and from 2½ to 3½ lb. iron are required to precipitate 1 lb. of copper from sulphuric acid solutions, owing to the large amount of basic salts formed. Sulphurous acid dissolves very small amounts of other metals that may be in the ore, and the precipitated cupro-cuprous sulphite is practically pure and furnishes pure copper by a simple smelting operation.

6. *The Rio Tinto Method of Gradual Lixiviation in Heaps.*—The writer agrees with Mr. Eissler in having a strong leaning towards this process of slow, but inexpensive, lixiviation, in cases where the climate is suitable, and where the chemical and physical condition of the ore favors the gradual and persistent formation of sulphates. (In the Rio Tinto method the poor coarse ore is built up in the form of large conical heaps, 10 to 15 ft. high and about 20 to 30 ft. apart. A fire is then lighted in each of these and the mixed lump and fine ore is filled in between them. The gas produced by combustion mixes with the steam generated from the moistened mass and permeates the whole mass of 4,000,000 tons of ore. After burning slowly for a period of four to six months, water is turned on so as to dissolve out the copper sulphate. This percolation and leaching process continues for about five years, the liquor being caught below in dams or large reservoirs built of masonry, the copper being precipitated on scrap iron.[2]

At certain Portuguese mines, such as the San Domingos works, a slow process by weathering was formerly employed on pyrites containing copper. For this treatment the soft, more permeable ores are best adapted. Heaps, containing from 100,000 to 250,000 tons of material, are built up, their assay contents ranging from 1½ to 2 per cent copper. About 88 per cent of the total copper is extracted in the course of six years, the remaining 12 per cent being recoverable only by a long and unprofitable continuance of the same treatment. At San Domingos as much as 3,000,000 tons have been under treatment at a given period. Plenty of stone flues are distributed on the surface of the ground and the mineral is dumped over them. These flues are connected one with another longitudinally and transversely, and at intervals they communicate with the outer air by vertical stone shafts. The object of this arrangement is, of course, to provide a plentiful supply of air in order to prevent the heaps taking fire. This last is detrimental because the cintering of the material obstructs the subsequent leaching of the copper.

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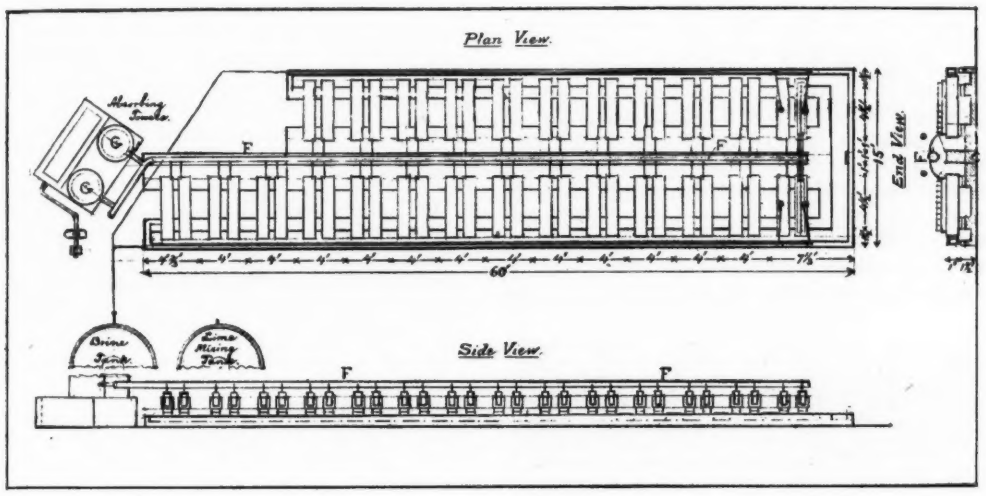

50-CELL McDONALD ELECTROLYTIC PLANT, AT CLARION PAPER MILL, PA.

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This leaves only the three methods of direct and rapid lixiviation of the ore without any previous mechanical concentration. An intimate knowledge of local conditions and costs, wide technical experience with modern lixiviation methods, and long and careful experiments on an extensive scale, on the ore to be treated, can alone decide the method to be chosen.

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THE MC DONALD ELECTROLYTIC CELL AS A CHLORINE PRODUCER.

BY TITUS ULKE.

Recent experience has led the writer to study carefully the merits of various electrolytic cells for the production of chlorine. The result of these investigations has led me to believe that the McDonald cell possesses many advantages in view of the simplicity of its design, its relative cheapness of construction, and the small amount of attention it requires. The following description of this cell is based upon the plant in operation at the Clarion paper mill, at Johnsonburg, Pa., which is one of the first commercial applications of this form of apparatus.

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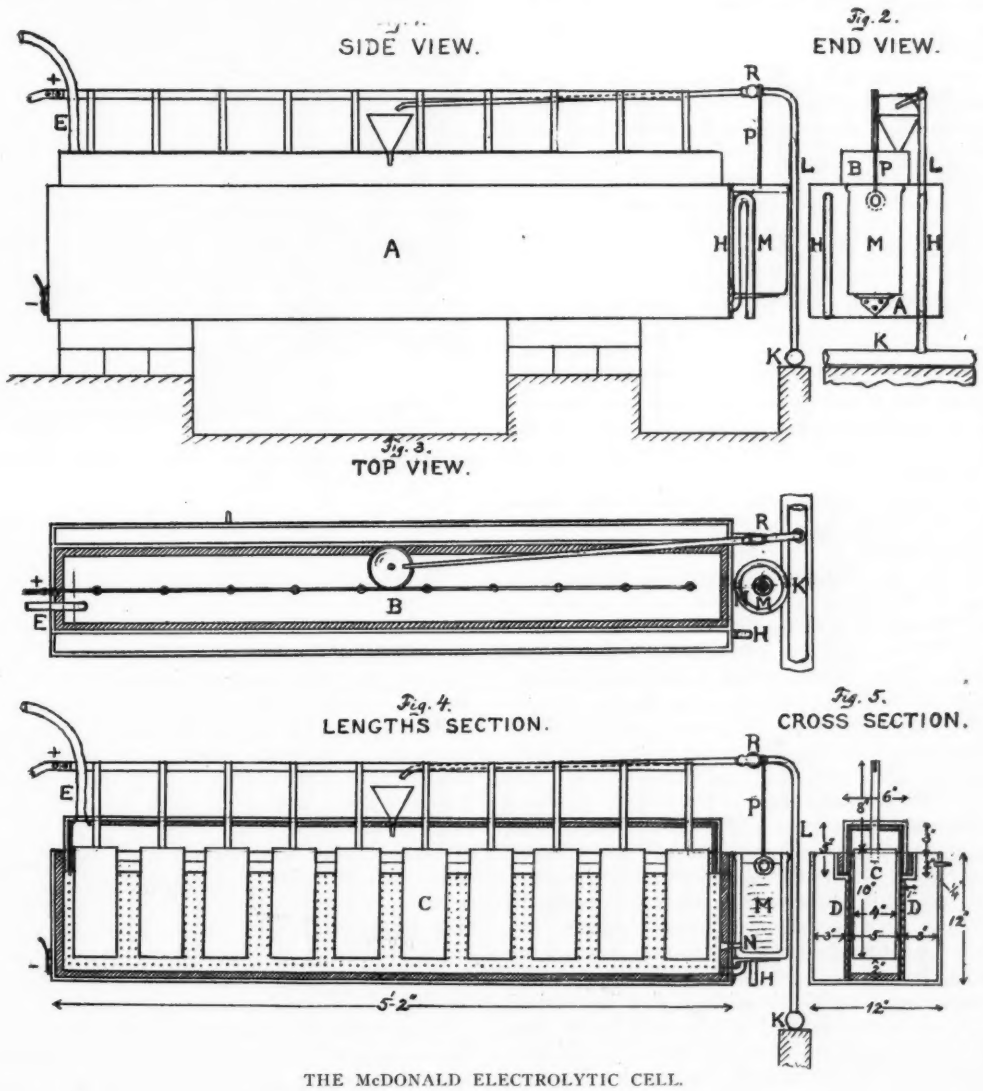
The electrolytic tank is 1 ft. wide and high, and 5 ft. 2 ins. long, and is cast in one piece with two longitudinal partition walls, thus dividing it into three compartments. It has the form shown in subjoined Figs. 1 to 5, and indicated by the letter A. Against each perforated side wall of the central or anode compartment of the tank is stretched a diaphragm, consisting of a layer of asbestos paper fastened to asbestos cloth by a small quantity of sodium silicate. This diaphragm is held in position by cement placed over both the end walls and the bottom of the anode compartment. The latter is closed by a cover, B, of cast iron, 5 ins. deep, 6 ins. wide and nearly 5 ft. long, into which the anodes are cemented.



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It is painted inside with asphalt varnish and lined with cement.

The anodes C consist of blocks of graphitized carbon, 4 ins. square and 10 ins. long, into each of which a round copper conductor, 9 ins. long, is fastened by means of hot lead poured in and about the socket, and over the copper so as to encase it completely in a protecting film of lead. The conductors are slit at their ends and connected in multiple by means of a flat copper bar, about 1-6 in. thick, resting in the slits. As all the cells of a group are placed in series circuit, the copper bar of the first cell only is attached to the positive line conductor, and the iron tank of the last cell to the negative line conductor, each one of the intermediate cells having its own copper bar connected by wire to the tank of the preceding cell in turn. The negative poles, therefore, are formed by the tanks themselves, or rather by their partition walls. These, as stated, are perforated, there being 4 or 5 perforations to the square inch, and each perforation measuring about 1-32 in. in diameter.

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The lead pipes E from all the cells lead through a flexible connection into the gas main of vitrified pipe F, Fig. 6, which carries the chlorine gas to the absorbing towers, G, where it is brought into contact with lime-water and lime to form bleaching solution ready for use in bleaching paper stock.

To return to the cell, each cathode compartment may be closed by a cover into which a pipe extends and through which the evolved hydrogen gas may be drawn off and utilized, although allowed to escape at present, as is the general practice with electrolytic chlorine plants.

In Figs. 1 to 5, H represents overflow pipes communicating with the cathode compartments for carrying off the caustic liquor. These pipes are of elbow form, and so arranged as to cause the with-

In reference to the results of tests quoted in this discussion by Mr. Muir, it is obvious that the results themselves are stronger arguments against the emploment of this process than any that the writer could advance. (The experiments of Mr. J. J. Muir were made on an Australian ore containing 3.94 per cent copper, 9.55 iron, 50.15 silica, 16.85 alumina and 19.51 per cent of sulphur and alkalis undetermined. A concentration test yielded a product representing 7.277 per cent of the original ore, but the assay gave only 11.12 per cent copper, with 28.40 per cent iron and 14.40 per cent silica. The tailings carried 3.37 per cent copper, so that the recovery was only 81 per cent of the copper contents.[1])

Without attempting to analyze his experiments in detail, the writer would simply point out that the results of Mr. Muir's concentrating tests show a saving in the concentrates amounting to about 20 per cent of the original copper contained in the ore, and a loss of nearly 80 per cent in the tailings. This, of course, means no concentration whatever, and there must be some reason, not apparent to the writer, why Mr. Muir attempted to concentrate at all.

If a portion of the copper in the ore were present in the shape of some mineral that would exercise an injurious effect upon the subsequent lixiviation, and if this mineral had a higher specific gravity than the remainder of the sulphides present, there might be some question of attempting to remove it by concentration. But, as the 20 per cent of the copper that was removed by concentration had, as the writer understands, exactly the same chemical composition as the 80 per cent left in the tailings, he fails to see the use of employing concentration; nor does he believe that these ores should be subjected to concentration. (It will be understood that the writer is referring solely to the ordinary methods of wet-concentration in making this statement, and that he is not expressing any opinion as to the results that might be obtained by one or two novel patented methods of which he has no personal experience.)

It seems to the writer most advantageous, therefore, to subject the entire mass of ore to lixiviation, rather than to complicate matters and increase expenditure by any preliminary concentration.

3. *Lixiviation of the Ore Direct, with a Solution of Ferrous Chloride and Salt (Old Hunt & Douglas Method).*—Considerable quantities of ore have been successfully worked by this process in the United States. The method depends upon the fact that oxide of copper is decomposed by ferrous-chloride solutions, forming insoluble ferric oxide, while the copper goes into solution as cuprous and cupric chlorides. It is precipitated in a very pure metallic form by iron, the ferrous-chloride solution being thus also regenerated, and requiring only the addition of a little salt to fit it for further use. The consumption of metallic iron in this method is very small, since much of the copper is in solution as cuprous chloride.

As the copper must be in an oxidized form, in order to go into solution quickly and thoroughly, the ore will require a preliminary roasting of sufficient thoroughness to convert most of the copper present into oxide or sulphate. This means that the ore must be crushed dry, though not to nearly so fine a state as would be required for its concentration. Therefore, instead of wet crushing followed by concentration, the writer would suggest dry crushing followed by roasting.

It is impossible to make a comparison of the costs of these two different plans of operation without being accurately acquainted with the physical and chemical character of the ore under consideration. By the use of modern high-speed rolls of great diameter and weight, and of the automatic reverberatory roasting-furnaces so generally in use in the United States and elsewhere, the cost of dry-crushing and roasting should not exceed the cost of wet-crushing and concentration, while the condition of the pulp for lixiviation is incomparably better when produced by the former treatment. Apart from the advantage gained by the coarser condition of the pulp, and the much lesser proportion of very fine powder, the ore undergoes a physical change in roasting, which makes it much like sand and gravel, and enables the solutions to permeate it with a completeness and rapidity that are quite surprising. The advantages thus gained will only be fully appreciated by those who have had experience in leaching the same ore both before and after roasting. They are so great that, in several instances in this country, tailings are roasted previous to lixiviation, solely for the purpose of improving their physical condition, and of increasing the thoroughnes and rapidity of the latter operation.

The writer desires to emphasize this dry crushing and roasting as being, in his opinion, the most important step towards a successful leaching of these ores by the methods that he has called Nos. 3, 4 and 5.

4. *Lixiviation of the Ore Direct, with Hydrochloric and Sulphuric Acids, which are Regenerated in the Solution by the Precipitation of the Copper from a Chloride Solution by Means of Sulphurous Acid (New Hunt & Douglas Method).*—By this method, the copper is precipitated from its chloride solution, by means of sulphurous-acid gas, which throws down the copper as a very heavy white cuprous chloride, that settles almost instantaneously. Sulphuric and hydrochloric acids are generated in the solution, which only requires the addition of salt to make it ready for further use.

One great advantage of this method is the rapid dissolving of the oxidized copper present by the strongly acid solution, which even attacks sulphides with consilerable energy. Any lead and silver present remain undissolved. The ores require to be roasted, as in the previous process. A supply of pyrite is essential to the economical working of this method, and, of course, it is very advantageous if these pyritic ores contain some metal of value.

5. *Lixiviation of the Ore Direct, with Sulphuric Acid.*—Mr. Muir has already considered this method in his paper, though he confined it to the treatment of the tailings after concentration.

The writer can only add that, if lixiviation is at all suited to the fine tailings and slimes from the concentrating process, it is still more feasible, and much more economical, when employed upon the coarsely-crushed and roasted ore; and, that instead of taking 11 weeks for the extraction of the copper, it is probable that, with roasted ore, an equally perfect extraction would be accomplished within 2 or 3 days.

(In this connection reference might be made to the process patented by Mr. James W. Neill. Sulphurous acid is used to leach the copper. This method was described in the ENGINEERING AND MINING JOURNAL of May 30, 1901, from which the following is now quoted: The native oxides and carbonates of copper are readily soluble in sulphurous acid with the formation of cuprous sulphite (Cu_2SO_3). This salt is insoluble in water, but soluble in water containing sulphurous acid, from which the copper can be precipitated by driving off the excess of sulphurous acid by heat. The precipitate is cupro-cupric sulphite ($CuSO_3$, $Cu_2SO_2 + 2H_2O$), and contains 49.1 per cent of copper. This salt is a heavy, crystalline compound, of a dark red color, which settles readily from the solution, and can be washed by decantation, dried and reduced to metallic copper by fusing on the hearth of a reverberatory furnace. The process is suitable both for sulphide and oxidized ores, the former being first roasted to expel the sulphur and convert the copper compounds into oxides, as sulphurous acid does not attack sulphides. The ideal ore is one carrying oxides or carbonates of copper in a siliceous gangue; lime and magnesia are objectionable, as they dissolve in sulphurous acid and, while they do not materially interfere with the reactions, they consume a certain amount of sulphur and so increase the cost of the process.

Sulphurous acid produced by roasting pyrite is the cheapest chemical procurable in the western country, and the plant is much simpler than that used in making sulphuric acid. A unit of copper converted into cuprous sulphite requires but half the sulphur that would be required to convert it into cupric sulphate. Cuprous sulphite is precipitated from the solution without the use of scrap iron, which is a great advantage in remote districts. In Southern Utah, for instance, scrap would cost from $40 to $50 per ton, and from 2½ to 3½ lb. iron are required to precipitate 1 lb. of copper from sulphuric acid solutions, owing to the large amount of basic salts formed. Sulphurous acid dissolves very small amounts of other metals that may be in the ore, and the precipitated cupro-cuprous sulphite is practically pure and furnishes pure copper by a simple smelting operation.

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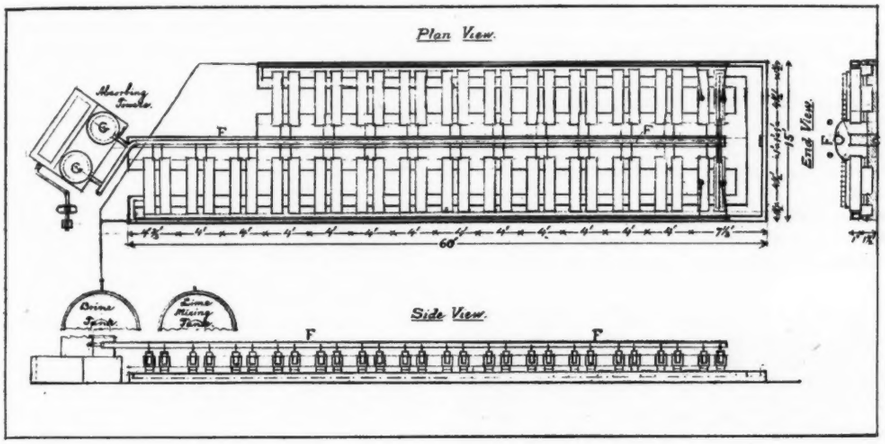

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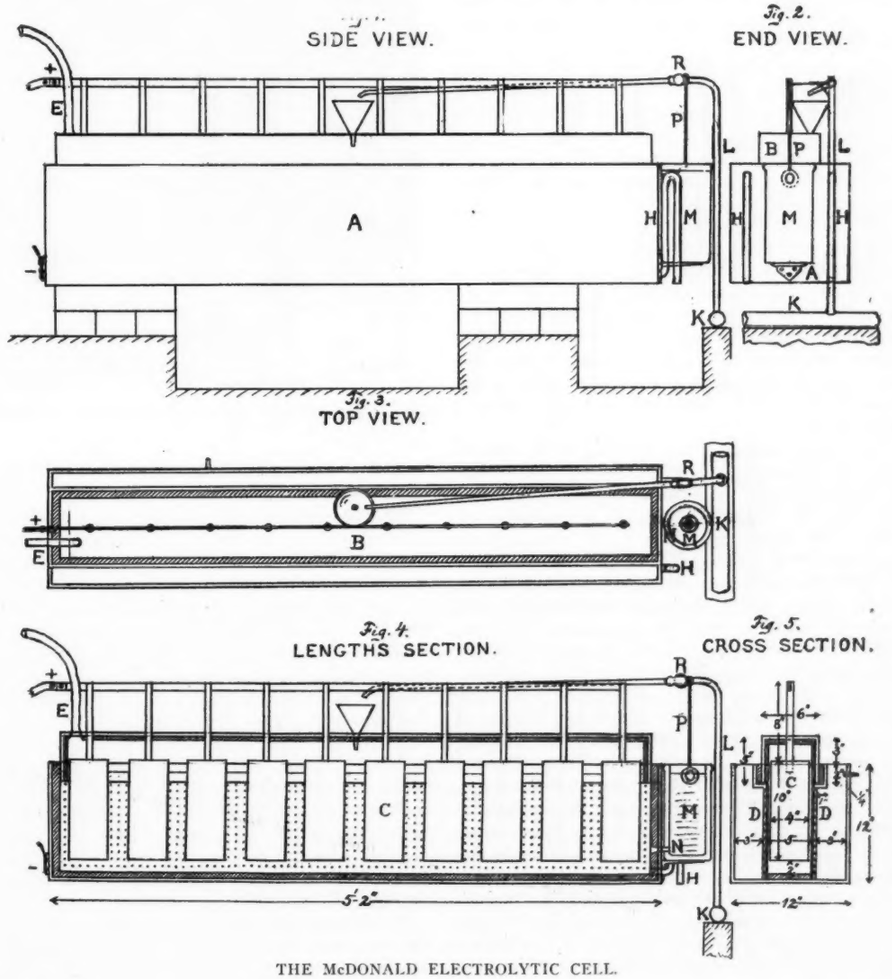
The electrolytic tank is 1 ft. wide and high, and 5 ft. 2 ins. long, and is cast in one piece with two longitudinal partition walls, thus dividing it into three compartments. It has the form shown in subjoined Figs. 1 to 5, and indicated by the letter A. Against each perforated side wall of the central or anode compartment of the tank is stretched a diaphragm, consisting of a layer of asbestos paper fastened to asbestos cloth by a small quantity of sodium silicate. This diaphragm is held in position by cement placed over both the end walls and the bottom of the anode compartment. The latter is closed by a cover, B, of cast iron, 5 ins. deep, 6 ins. wide and nearly 5 ft. long, into which the anodes are cemented.



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The partition walls D are flanged, as shown in Fig. 5, so as to form a seat for the reception of the cover and for a layer of cement, which extends completely around the cover and hermetically seals the joints between the same and the end and partition walls of the tank, and thus prevents the escape, except through lead pipe E, of the gases from the anode compartment.

The lead pipes E from all the cells lead through a flexible connection into the gas main of vitrified pipe F, Fig. 6, which carries the chlorine gas to the absorbing towers, G, where it is brought into contact with lime-water and lime to form bleaching solution ready for use in bleaching paper stock.

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drawal of the caustic liquid from the bottom of the cathode compartments, thus preventing the escape therethrough of the hydrogen gas.

The brine is supplied to the anode-compartment from the brine main K through pipe L, and its feed may be controlled by an automatic feeder consisting of a vessel M, in communication by a tube N with the anode compartment, so that the level of the liquid in said compartment and vessel will always remain the same. A float O is contained in the vessel M, and is connected by a rod P with a pivot valve R in the pipe L, whereby the rise and fall of the liquid in the anode compartment controls the supply of fresh liquid through the pipe L thereto.

In operation, the compartments are filled with brine, and the electric current is then turned on. The chlorine gas accumulates in the anode compartment and passes into the gas main, while caustic soda (NaOH) appears in the cathode compartments, as a result of the action of the separated sodium on the water according to the equation:

$$Na + H_2O = NaOH + H.$$

In this way the practical separation of the chlorine gas from the hydrogen gas and caustic liquor is effected.

The McDonald electrolytic bleach-plant, in the Clarion paper mill belonging to the New York & Pennsylvania Company at Johnsonburg, Pa., was built in the spring of 1902, and has been in successful and almost continuous operation, I understand, ever since its erection. Previous to this time thousands of dollars had been spent by the company in experimenting with the Hermite Romme and Mercer cells, but without finding any of these suitable for adoption.

The present installation consists of 50 McDonald cells, arranged in two parallel rows and occupying a floor space of about 60 by 15 ft., as indicated in the plan and elevation in Fig. 6.

With a current of 420 amperes and 225 volts (4.5 volts per cell), it appears that about 1,400 lb. of chlorine are produced daily. With 500 amperes at 250 volts, under the most favorable conditions, it is claimed that the plant could make 5,000 lb. of bleach, containing 35 per cent available chlorine daily. This figures out to 167.5 electrical horse-power for 2.5 tons of bleach, or 67 horse-power per ton per day, or nearly 10.5 lb. of chlorine per horse-power day. Mr. McDonald affirms that a ton of bleach does not cost him over $12 to $15 to produce, even without counting in the value of the caustic liquor and hydrogen obtained as by-products.

The above very excellent showing is the reason why the erection of a large electrolytic bleach plant at Johnsonburg in the near future is contemplated, and why the McDonald cell will be employed, as soon as the necessary equipment can be secured, by the Standard and Colorado City chlorination works in Colorado, which are probably the largest in the world. These plants, having a combined daily capacity for treating 700 tons of gold ore, are now paying, it is claimed, $2.25 for every 100 lb. of bleach delivered at Colorado City, or $45 per ton, and probably $1.30 for every 100 lb. of sulphuric acid. The cost of the chlorine figured as bleach will be reduced to less than $15 per ton of bleach, or less than $45 for a ton of chlorine itself, it is believed, when the new electrolytic chlorine plant comes into operation. This installation, according to report, will eventually comprise 500 cells, costing with royalty $50,000 complete, and located in a building approximately 200 by 200 ft.

Moreover, no sulphuric acid will then be required, as the chlorine employed will be used in the form of chlorine-water, by saturating water with chlorine, instead of being produced by decomposing bleaching powder with acid, as formerly.

In this way there will be a considerable saving in the cost of treatment, which will enable lower grade gold ores to be worked at a profit, and thus help both miner and metallurgist. The sale of the caustic soda, obtained in the above process as a by-product, should increase the profits materially.

At Johnsonburg the caustic liquor flowing from the cells average 3 to 4 per cent salt, and about 16 to 18 per cent NaOH, according to Mr. McDonald. It is wasted at present, but plans are now in hand for evaporating it down, separating out the salt, and utilizing the resulting caustic soda in the cooking of soda-pulp.

A COPPER MINE IN CENTRAL AFRICA.

The accompanying view shows one of the copper mines lately discovered in the Tanganyika District of Central Africa. The open-cut shown in the photograph was made by the native workers, who have obtained copper from the outcrops, for an unknown period. The little shaft in the bottom of the open-cut has been started by the prospectors, who found the mine. The prospectus of the Tanganyika Concessions, Limited, gives the following statements

KANSANHI COPPER MINE, TANGANYIKA REGION.

from Mr. F. E. Studt, the discoverer of the Kansanshi Mine, as it is called:

"It is a very extensive, disused copper mine, in which there are some 6,000 ft. in length of old workings. These are in parallel lines (approximately), which have in places been worked to depths of 50 ft. from the surface and are in the form of short trenches, varying from a few feet to some 1,200 ft. in length, and from 1 to 75 ft. in width. They are in places still 30 ft. deep, although they have been partially filled by debris washed in by the rains, etc.; their direction is almost due north and south.

"Five shafts have been sunk in these trenches, all of which expose reefs varying from 1 to 9 ft. in width. The material excavated from these trenches is dumped along both sides of the workings and contains fragments of reef matter. There are also in places portions of the reef matter still left attached to the walls of the workings, as well as in some of the ends of the workings.

"From inspection of the reefs in the shafts and of the reef matter found elsewhere, as I have described, I find that the reef matter consists of a ferruginous siliceous matrix, containing copper minerals, more or less plentifully. In the superficial portions of the reefs, these latter are chiefly malachite and chrysocolla, but sometimes also azurite and melaconite (containing manganese dioxide), but in the deeper portions there are sulphides also, as chalescite and chalcopyrite, besides some cuprite.

"The ferruginous matter is chiefly limonite (in the superficial portions), which is sometimes hard and compact, and sometimes soft and ochric; there is also a little hematite. In the lower portions of the reef iron pyrite is also found. Besides these minerals there is much quartz, which is clear white and glassy, and some free gold, both fine and coarse. The superficial parts of the reefs are mostly soft, and often clayey, but sometimes hard and compact. The quartz in the softer reef matter is much broken up and the cracks often filled with layers of copper minerals; but in the harder portions it is more compact and often runs in distinct veins in the reef matter. . . .

"The eastern workings seem to be more ferriferous than those on the west. Those on the hill and to the north of it have much the same characteristics as those to the south. The southern ends of the workings are more overgrown by vegetation, and also have some large trees growing in them in places, which may be owing to their greater age or to their nearness to the bush.

"The country rock of the whole area is sandstone, which is more or less charged with copper in the form of malachite. In some places it is very micaceous and fissile, and in others it is soft and clayey (probably due to decomposition of mica). . . . In other places again, the country is quite black, due to the presence of graphite, which in one sample assayed about 8 per cent. This, as far as I know, is not rich enough to make it of any value as a source of graphite. . . .

"In the southern part of the mine the formation is practically horizontal, but as it approaches the hill (from all directions) the dip is away from the hill and may be anything up to 40° in places. On the hill itself the strata mostly follow the contour of the hill, excepting on the upper portion of its northern slope, where there is a persistent tendency to the south."

COAL EXPORTS FROM POLAND.—The owners of collieries in Poland are endeavoring to work up the export trade in coal. The Sosnowice Company, the largest concern in the Polish basin, has opened offices in Vienan, and the organization of joint agencies is proposed. The mine owners of the Donetz Basin already have agencies in Germany and Austria.

REPORTS ON TEXAS LIGNITE.—In view of the increasing interest in the use of lignite as fuel and the possibility of the erection at St. Louis, during the World's Fair, of a complete briquetting plant, many of our readers will be interested in knowing that the University of Texas Mineral Survey, Austin, Texas, has on hand a considerable number of a report on brown coal and lignite of Texas, made by Mr. E. T. Dumble in 1892. These will be distributed on application, the postage being 15c. The edition of the Survey's recent *Bulletin* on Coal, Lignite and Asphalt Rocks, 1902, has been exhausted, but Mr. Dumble's report will be sent to any one applying and forwarding the necessary postage.

DEMAND FOR SULPHUR IN CANADA.—Quantities of crude brimstone are being imported from Sicily, but by far the greater part of the consumption is satisfied by Canada itself. It is calculated that over 5,000,000 lb. of sulphuric acid are used annually in the refining of Canadian petroleum. Only a few concerns, however, are engaged in manufacturing sulphuric acid. The Lake Superior Power Company recovers the sulphur from smelting nickel ores, and uses it alone for manufacturing sulphite pulp. Across the line at Niagara Falls, New York, the Electric Lead Reduction Company is producing sulphuric acid from the electrolytic treatment of galena, and it is said has proved a financial success. An opinion is advanced that a similar industry will be established on the Canadian side.

ROCK SALT MINING IN KANSAS.

By W. R. CRANE.

The mining of rock salt was begun in Kansas at Ellsworth in 1887. A number of mines have been opened up and developed since then, and the enterprise thus started has become a stable industry. The district to which the mining operations are confined, and which has also been fairly well outlined by prospect holes, is rather limited, being a narrow strip of country some 30 miles wide by 120 long, extending in a north-and-south direction and lying in the south-central portion of the State.

It is not a continuous and uniform stratum, but rather is apparently made up of isolated patches of irregular and limited extent. Mining by shaft is not warranted unless preceded by extensive and systematic prospect drilling, which is rather expensive, as the workable portion of the salt-beds lies at depths varying from 700 to 900 ft. Where the preliminary operations show a tendency toward irregularity, and a consequently impure deposit, the salt is extracted by solution through bore holes.

At present, mining by shaft is carried on at several points, the more prominent of which are Kanapolis, Lyons and Kingman. These places are situated at the two extremes and in the middle portion of the rock-salt area.

It has been determined by bore-holes that from 250 to 300 ft. of rock salt exists, yet only a relatively small part of this is pure enough to mine. The workable part of the salt stratum varies in thickness from 8 to 17 ft., and lies between two shale partings, from 1-16 in. to 12 and 18 ins. thick, the greatest variation being in the upper shale. To work to the partings means the introduction into the salt of more or less shale, either adhering to the salt, or broken up and mixed by blasting. In portions of the field, where the partings are thinnest, it has been found permissible to work to them, both above and below, but it necessitates careful hand-picking to separate the objectionable material.

The room-and-pillar system of mining is employed. The method of laying out the entries and rooms differs somewhat, however, in the mines of the district, on account of the occurrence of isolated masses of impure and variously colored salt.

The system which seems most applicable under the conditions of irregularity of formation is the single-entry method, square pillars being developed. As a rule, however, the pillars are seldom exactly square, but vary with the nature and extent of the impurities encountered. In such cases certain rooms may be prolonged, while others are omitted until the objectionable portion of the stratum is passed. When this method is employed the entries and rooms are driven 35 ft. wide and 35 ft. apart, thus leaving pillars 35 ft. square. Side entries are run at right angles to the main gangway, and at a distance of 150 to 200 ft. apart, from which rooms are driven with 70-ft. centers.

Where the salt is thicker and fewer impure masses are met with a system of rectangular pillars, uniformly arranged, is employed, the single-entry method being adhered to. This method is shown in Fig. 1. Side entries are run normal to the main way or ways (two being sometimes employed), and spaced 300 or 400 ft. apart, from which rooms are driven, at intervals of 50 ft., parallel with the main way. Rooms driven transversely from the side entries will ultimately meet and form a passage extending from one entry to another.

To facilitate the handling of the salt and the movement of the air currents a system of cross-cuts is run at right angles to the rooms and spaced 100 ft. apart. The entrance to the rooms on the entries, as well as to the cross-cuts on the main ways, is constricted in height and width to facilitate the closing of the same. The main-way, side entries and rooms are driven 50 to 55 ft. wide and 15 ft. high, while the cross-cuts are 35 ft. wide and of the same height as the former. Pillars 50 ft. wide and 100 ft. long are thus formed.

The method of working in the rooms, or the cutting out of the breast, depends largely upon the thickness of the shale partings. When a top and bottom of salt is left, careful and systematic undercutting must be resorted to, which is usually accomplished by mining machines of the reciprocating or pick type—the Ingersoll make is that commonly employed.

The cut made by the machine is 4 ins. above the lower shale parting, 3½ to 4 ft. deep, and has a height of 4 and 16 to 18 ins. on the inner and outer faces respectively. The cutting bits are 8 ins. long, and have a fish-tail cutting edge about 2 ins. wide. The machine is operated on a 4 by 8-ft. platform, the back end of which is elevated 20 ins. above the floor, thus giving sufficient slope to feed the machine to the face by gravity. The salt is tough and not readily cut, there being a tendency to pack under the stroke of the bit, so rather a steep slope of platform is necessary to ensure the best results. On account of the difficulty experienced in cutting, the whole depth of cut is not made at one operation, but instead is divided into several "trips," each trip advancing the face of cut from 18 to 24 ins. To make a complete undercut across the full width of face of a room requires about 10 hours. Only one man is required to operate the cutter.

When the salt is taken out to the shale partings no undercutting is attempted, the shots being placed so as to break to the partings both above and below. The partings are remarkably smooth and regular, so much so that a block of salt, when loosened from the bed, can be forced from the face between the partings without being broken up. In fact, the shale acts as a lubricant upon which the loosened masses slide. Under such conditions of formation the salt is broken from the face by shots placed according to the American center cut system. Eight or ten holes are drilled in two vertical rows—four or five holes to the row, having a collar of 9 ft. The holes are usually 7 ft. long and converge until their inner ends approach within a foot of one another. Often as much as 6 and 10 lb. of powder (dynamite) is used for a hole, and it is common to break from 90 to 135

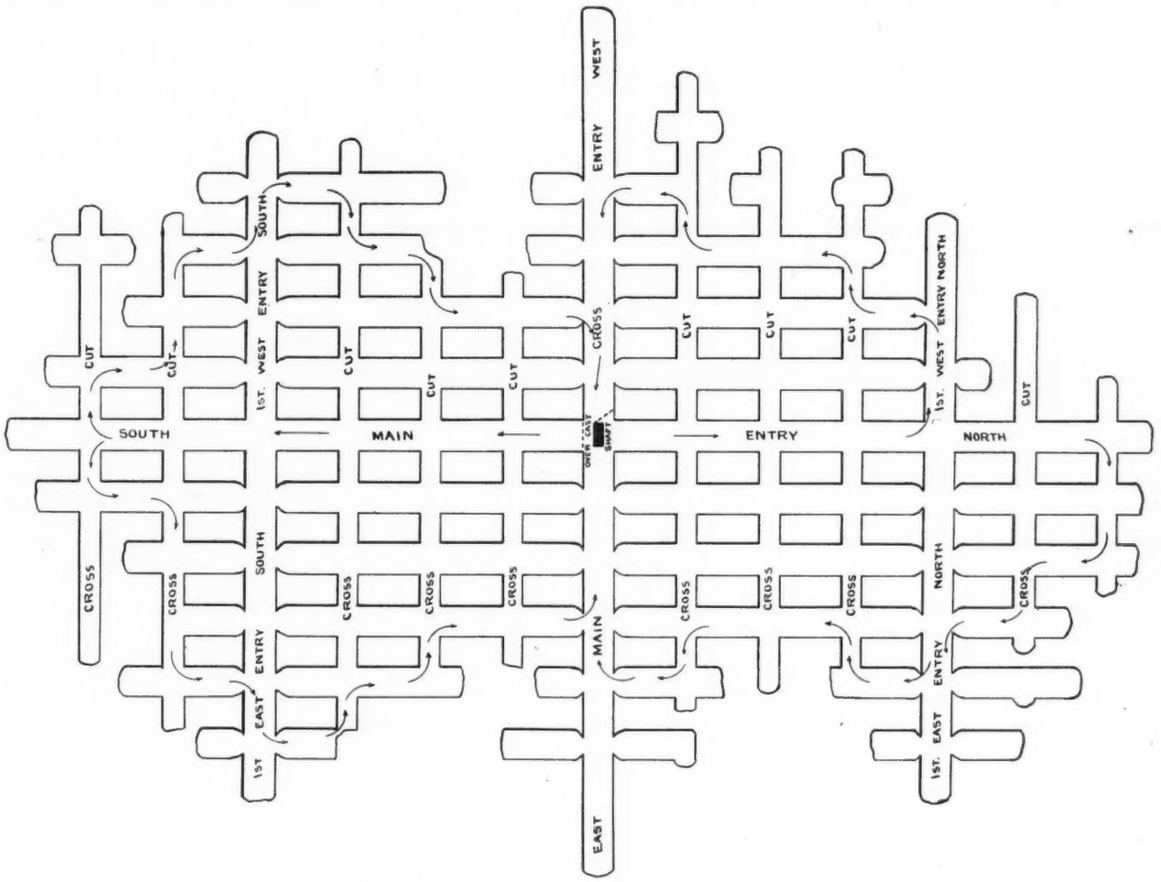


FIG. 1.—PLAN OF TYPICAL KANSAS SALT MINE. RECTANGULAR PILLAR SYSTEM.

tons from the face at a single blast, while occaionally masses of 150 to 250 tons are forced into the rooms 6 to 8 ft. from the breast. Such occurrences are, however, far from satisfactory, as it means that further blasting must be resorted to to break up the detached masses.

The re-entrant angles, formed in the face by the forcing out of such wedge shaped masses, are called "sumps," and when sufficiently deep, so unbind the face that only one vertical set of holes (to a side) is necessary to break out salt on the sides of the sump. From such a sump, centrally placed, the whole width of the face of a room is often cut out to the depth of the sump, when another sump may be formed and another advance made from its unbound faces, otherwise individual center cuts must be employed in breaking down the breast.

When undercutting is employed the work of extraction takes place wholly within the salt stratum; the top, bottom and walls are solid salt. Aside from the under cut the face is advanced by stages, a system of overhand breast stoping being employed in loosening and breaking down the salt. Fig. 2. Holes in this method of mining are seldom placed according to the center-cut system, but are grouped in two classes—"miners" and "breakers"; the former are placed end on—normal to the face on the vertical portion—while the breakers are drilled more or less

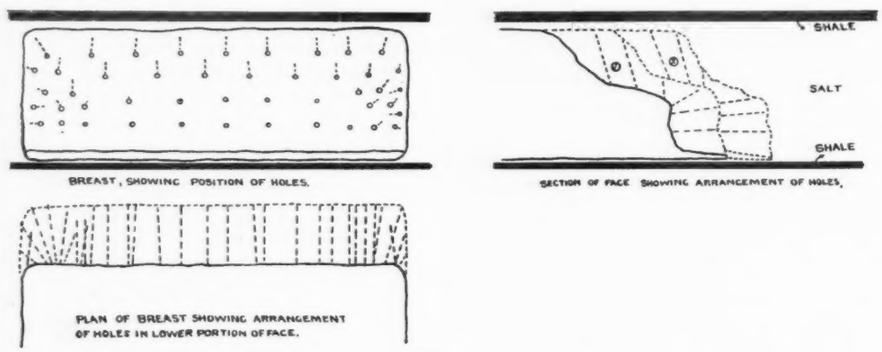

BREAST, SHOWING POSITION OF HOLES.
SHALE
SALT
SHALE
SECTION OF FACE SHOWING ARRANGEMENT OF HOLES.
PLAN OF BREAST SHOWING ARRANGEMENT OF HOLES IN LOWER PORTION OF FACE.

FIG. 2.

vertically and extending backward. The breakers are carefully placed so as not to fracture and break down the thin shell of salt left between the shale parting and the portion worked. They advance the upper part of the breast, and if the miners were not fired would make a very nearly vertical face, with the exception of the undercut, which is always formed before the holes are drilled. The miners and breakers are usually charged and fired together; occasionally the former will be fired first. The breakers range from 5 to 7 ft. in length, while the miners are much shallower and are usually 4 ft. deep. Owing to the toughness of the salt the ends of the holes should not be further apart than 2 ft., otherwise a projecting mass or angle of salt will remain between them. The miners force the salt into the undercut below, extending the face for further breaking down by the breakers, thus advancing the whole breast. It is evident from this arrangement of holes that the junction of the face with the walls, or the corners, will tend to become rounded instead of making a sharp, well-defined right angle, producing what is known as a "tight corner," which difficulty will increase rather than diminish unless an attempt is made to remedy it. This is accomplished by drilling deeper holes and slanting or converging them as in the center-cut system. Usually only a few are so placed and are given a larger charge than the others; the result obtained being quite satisfactory. Tight corners are thus prevented from forming.

When all the salt broken down, by a round of shots at the face, is cleaned up, which is done as rapidly as possible, and the operations of drilling and under-cutting are resumed preparatory to making another advance.

In both methods of working at the face, large masses of salt will usually remain practically intact, while others, although apparently solid, are more or less fractured. To still further reduce the large pieces, "bulldozing" is resorted to; that is, powder is placed on a block and fired, which seldom fails to break up, or sufficient fracture the masses, so that further reduction is easily accomplished by hand. The smaller pieces, which are still too large to be handled readily, are broken up by a gad and a sledge.

Little or no water enters the mines at the level at which mining is carried on, but at a depth of 250 to 300 ft. a stratum of gypsum is passed through, above which considerable water is encountered. It is intercepted, caught in water lodges and raised to the surface by pumps. Salt collects considerable moisture from the atmosphere and thus, during wet weather, especially the workings are unusually wet and dripping.

Air currents set up and maintained by natural means furnish, under normal conditions, sufficient ventilation during the greater part of the year. Fans are, however, always provided and are operated on the exhaust system. The sizes usually employed are 4 by 16 or 22 ft., and they are of the Guibal type. The air currents are split and regulated by equivalent orifices, in order that each portion of the mine may receive its required amount. See Fig. 1.

No supports other than pillars of salt are employed, except in the shafts, which are usually cribbed with 6 by 8 or 8 by 10-in. oak timbers. Salt forms an excellent support, as it is tough and solid, and does not readily disintegrate when exposed to air and moisture while the cracks tend to heal or cement up. In the thicker portions of the salt stratum, where mining is carried on wholly in the salt, an arching of the roof allows a greater width of room than when such an arrangement is not permissible. Care should be taken, however, not to cut too close to the shale parting above or the thin shell of salt, thereby causing the shale to fall, which is the only difficulty experienced in that connection.

Mule haulage is the only method of transportation employed in the mines at present. Care has to be taken of the animals, as the rock salt tends to produce sores on the legs and to injure the hoofs. Cars, which have a capacity of 2,200 to 3,300 lb. are hauled singly. Steel and iron rails are commonly used, which weigh 20 and 16 lb. to the yard, respectively.

The mines are illuminated either by oil torches or electric lights, the incandescent system being employed.

Drilling is accomplished by compressed air drills of the rotary type. The augers range from 1½ to 2 ins. in diameter, and are used in sets of three or four, according to length, as 18, 36 and 72 ins., or 18, 24, 48 and 84 ins. The post points employed in elevating the drill are 8, 18, 24 and 36 ins. in length. Sticks of dynamite 1¼ and 1¾ ins. in diameter are used, and are fired by electricity, the charges being arranged in series.

The air receivers for underground work must be protected from the action of salt water, otherwise they will rust out in a surprisingly short time. They are usually covered with several coats of tar, which are applied from time to time as occasion demands.

The head-frames are enclosed by the shaft house and carry 6 to 8-ft. sheaves of the bicycle type. The shafts have double hoisting compartments—5 by 7 or 6 by 7 ft., and airways 4 by 7 or 5 by 7 ft. Single deck cages are employed, supported by 1¼-in. steel rope, which winds up on cylindrical (wood-lagged) or differential drums. The hoisting engines are direct-acting, duplex, of about 150-h.p. each, and are provided with link motion reversing gears and hand operated band brakes.

The mine-run salt on being hoisted is dumped into chutes which conduct it over grizzlies where two sizes are made, lump, and all sizes under 6 ins. Part of the over-size (lump) is separated by hand and constitutes the "stock" salt. The remainder is reduced by sledge and then passed through toothed and corrugated rolls, with the under-size from the grizzlies, thence over shaking screens which are given rectalinear and curvilinear motions. The resulting sizes are governed by the market demand; as many as nine sizes are produced.

Salt being a cheap commodity, its mining and milling must be conducted along extremely economical lines, if such operations are to prove remunerative.

IRON AND STEEL EXPORTS AND IMPORTS.

Exports of iron and steel—including machinery—from the United States for the four months ending April 30, are valued by the Bureau of Statistics of the Treasury Department at $31,273,283, against $33,137,293 in the corresponding period in 1901; a decrease of $1,864,010, or 5.6 per cent, this year. The principal items of these exports are shown in the table below, in long tons:

	1902.	1903.	Changes.
Pig iron	32,982	4,982	D. 8,000
Billets and ingots	525	564	I. 39
Bars	11,328	13,665	I. 2,337
Sheets and plates	5,044	5,099	I. 55
Rails	33,127	2,612	D. 30,515
Structural steel	31,553	9,986	D. 21,569
Wire	31,940	35,278	I. 3,338
Nails	9,566	11,779	I. 2,213

The only increases shown were in lines where there is a long established trade. It must be remembered that in 1902 exports had fallen off very largely from those of the preceding year.

Exports of iron ore for the four months were 2,217 tons, against 4,524 tons last year; a decrease of 2,307 tons.

The total value of iron and steel imports for the four months is given at $17,036,820, against $8,271,972 in the corresponding period last year; an increase of $8,764,838, or 105.9 per cent. The chief items of these imports were in long tons:

	1902.	1903	Changes.
Pig iron	52,437	315,438	I. 263,001
Scrap iron and steel	11,418	33,678	I. 22,260
Ingots, billets and blooms	26,123	119,323	I. 93,200
Tin plates	23,329	19,167	D. 4,162

The reason for the large increase in imports this year is found in the heavy consumption of iron and steel here. British and German pig iron and steel billets have found quite an extensive market along the Atlantic Coast. While the quantities taken are comparatively large, they are, however, insignificant when compared with our total production.

Imports of iron ore for the four months were 242,013 tons, against 331,557 tons in the corresponding period last year; a decrease of 89,544 tons. The greater part of this iron ore came from Cuba.

MINERAL IMPORTS AND EXPORTS OF SPAIN.—Imports of fuel into Spain for the three months ending March 31 were 502,398 tons of coal and 51,871 tons of coke. Exports of minerals for the three months are reported by the *Revista Minera* as below, in metric tons:

	1902.	1903.	Changes.
Iron ore	1,633,697	1,875,762	I. 242,065
Copper ore	217,119	229,447	I. 12,328
Zinc ore	13,225	35,264	I. 22,039
Lead ore	1,035	654	D. 381
Pyrites	111,556	126,874	I. 15,318
Salt	61,716	57,098	D. 4,618

Exports of metals included 11,177 tons of pig iron, against 11,888 tons in 1902; 7,822 tons of copper, against 5,578 tons; 309 tons spelter, against 605 tons; 35,447 tons lead, against 34,729 tons last year.

COAL PRODUCTION OF PENNSYLVANIA.

The advance figures from the report of the State Mine Inspectors to the Bureau of Internal Affairs, of Pennsylvania, for the year 1902, have just been received. Separate reports are made for the anthracite and bituminous region. That for the anthracite production, of course, reflects the long cessation of output caused by the great strike, and in all comparisons made for the previous year full allowances must be made for this fact. The following table shows the production of anthracite coal for two years past with the disposition of the output, the figures being in long tons of 2,240 lb.

	1901. Tons.	%	1902. Tons.	%	Changes. Tons.
Shipped	53,447,902	89.2	31,551,818	85.5	D. 21,896,084
Local sales	1,178,674	2.0	934,957	2.5	D. 243,717
Used at mines	5,279,025	8.8	4,424,779	12.0	D. 854,246
Total Mined	59,905,601	100.0	36,911,554	100.0	D. 22,994,047

There is little to be said here in addition to what has already appeared in our columns upon the strike. The only point which seems worth noting in the table given is the large increase in the proportion of coal used at the mines. This was due, of course, to the necessity of pumping and other work, even when the mines were producing nothing. Naturally, the proportion thus used was much greater than with a large output.

Among the miscellaneous statistics of the anthracite region, we find that there were used in blasting 845,147 kegs of powder, and 2,130,965 lb. of dynamite, these amounts being only about one-half of the quantities used in 1901. Mule haulage, in many anthracite colleries, is still in vogue, and 16,139 horses and mules were reported last year. Mechanical haulage is on the increase. The number of locomotives in 1902 was 481. Of these, 373 were steam locomotives, an increase of 11 from the previous year; 55 compressed air, an increase of 4; and 53 electric motors, an increase of 13.

The number of boilers in use at anthracite mines at the close of 1902 was 4,928, and the number of steam engines 4,494. There were 837 pumps of various classes in use. The total capacity per minute at which these pumps were rated was 612,906 gals., while their total reported duty amounted to 431,941 gals. per minute. There were 75 electric dynamos, and 146 air compressors in use at the end of 1902, showing an increase of 4 dynamos and 6 compressors during the year.

The total quantity of bituminous coal mined in the twelve districts into which the bituminous region of the State is divided, together with the disposition of this coal, is shown in the following table, the figures being in short tons, of 2,000 lb.:

	1901. Tons.	%	1902. Tons.	%	Changes. Tons.
Shipm'ts	59,974,631	74.1	74,092,062	74.8	I. 14,117,431
Local sales	1,008,457	1.2	898,024	0.9	D. 110,433
Used in coke-ovens	18,495,487	22.9	21,964,532	22.3	I. 3,469,045
Used at mines	1,435,661	1.8	1,992,499	2.0	I. 556,838
Total	80,914,236	100.0	98,947,117	100.0	I. 18,032,881

The miscellaneous statistics of the bituminous districts show that there were in use at the mines, at the close of 1902, a total of 2,181 boilers and 1,615 steam engines of all classes, both totals showing an increase during the year. The number of horses and mules for haulage use was 11,833, also a large increase. The tendency in favor of mechanical haulage is increasing in these mines, but electricity seems to be most favored. There were in use at the close of the year 130 steam locomotives, a decrease of 4; 16 compressed air locomotives, a decrease of 7; and 32 electric locomotives, an increase of 91 during the year. There were 306 electric dynamos and 336 air compressors in use, an increase of 65 dynamos and 81 compressors. Notwithstanding the larger production of coal in the bituminous regions, the quantity of water pumped is less than in the anthracite mines. There were 884 pumps delivering water to the surface, the total rated capacity being 335,983 gals. per minute, while the actual duty reported was 183,072 gals. per minute.

Reducing both anthracite and bituminous to the common standard of short tons, of 2,000 lbs., the total production of the State was as follows:

	1901.	1902.	Changes.	%
Anthracite	67,094,665	41,340,940	D. 25,753,725	38.4
Bituminous	80,914,236	98,947,117	I. 18,032,881	22.3
Total	148,008,901	140,288,057	D. 7,720,844	5.2

The large increase in bituminous coal, therefore, did not quite make up for the decrease in anthracite. The total output was below the demand, as was shown by the scarcity prevailing through the latter half of the year.

The total coke made, according to the report, was 14,741,091 tons in 1902, against 13,125,156 tons in 1901; an increase of 1,615,935 tons, or 12.3 per cent. There were 34,423 coke-ovens reported last year, against 31,845 in 1901; the average output per oven was, therefore, 428 tons, against 412, showing an increase of 16 tons per oven. There were 21,964,532 tons of bituminous coal, or 22.3 per cent of the total output, used in making coke.

The total number of employees in both the anthracite and bituminous mines, and the number of fatal and non-fatal accidents are shown in the accompanying table. The inspector's report gives the average number of days worked in 1902 at the anthracite collieries at 116, against 194½ in 1901. In the bituminous mines the work was much more constant, the average number of days reported being 220⅔ in 1902 and 216¼ in 1901. In the table given the number of days' work is, of course an approximation, the figures being obtained from the number of employees reported and the average number of days worked in the mines:

	1902.	1902.	Changes.
Anthracite:			
No. of employees	147,651	148,141 I.	490
No. of days' work	28,716,120	17,184,356 D.	11,531,764
Fatal accidents	513	300 D.	213
Killed per 1,000 employees	3.47	2.03 D.	1.46
Killed per 1,000 days' work	0.018	0.017 D.	0.001
Non-fatal accidents	1,243	641 D.	602
Injured per 1,000 employees	8.42	4.33 D.	4.09
Injured per 1,000 days' work	0.043	0.037 D.	0.06
Bituminous:			
No. of employees	117,602	135,386 I.	17,784
No. of days' work	25,431,433	29,875,177 I.	4,443,744
Fatal accidents	301	456 I.	155
Killed per 1,000 employees	2.56	3.37 I.	0.81
Killed per 1,000 days' work	0.112	0.115 I.	0.003
Non-fatal accidents	656	861 I.	205
Injured per 1,000 employees	5.58	6.36 I.	0.78
Injured per 1,000 days' work	0.026	0.028 I.	0.002

It will be seen in the anthracite region the number of accidents decreased, this being due, of course, to the cessation of work for a considerable portion of the year. The figures giving the number killed per 1,000 employees show a large decrease in consequence; but it will be seen that the averages per 1,000 days' work are almost the same. In the bituminous field the number of fatal accidents increased very largely, this being due to two or three bad accidents; notably the explosion in the Rolling Mill Mine, at Johnstown, in which 112 persons suffered. The showing made, therefore, last year in the bituminous country is almost as bad as that of the anthracite mines, although for a series of years previous the proportion of accidents has been very much less in the former region.

TRUCK SUPPORT FOR FURNACE-BOTTOMS.*

By Henry A. Mather.

While this device is not new, it failed to be of practical utility until furnace builders instituted the mechanical reform of supporting the upper and lower water-jackets by hanging them from an I-beam frame, independently upheld by iron columns, instead of resting the entire weight of structure on the bottom, as practice formerly prescribed. The Colorado Iron Works were among the first to build copper furnaces of this description, and the device, illustrated herewith, has been installed by them in three recent plants—two furnaces for the Westinghouse interests near Ely, Vermont, and one for the Grand Prize Copper Company, of Gila County, Arizona.

The jack-screw supports (Figs. 1 and 2) and the familiar iron bottom of former practice are retained as integral parts of this new furnace bottom. And,

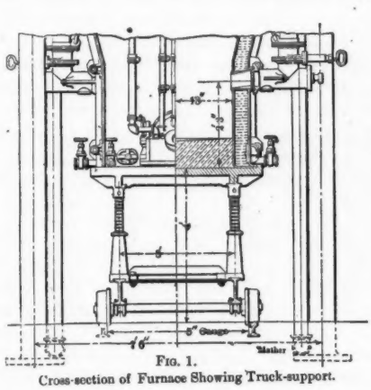


Fig. 1.
Cross-section of Furnace Showing Truck-support.

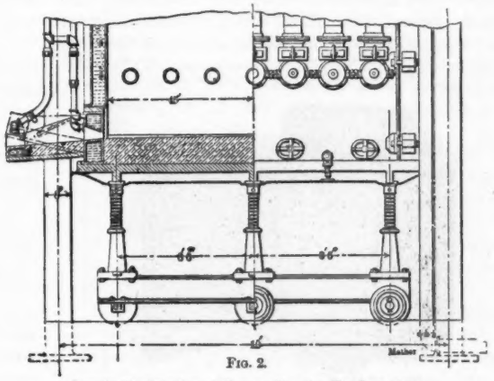


Fig. 2.
Longitudinal Section of Furnace Showing Truck-support.

TRUCK FOR FURNACE BOTTOMS.

instead of resting inert on the tap-floor of the furnace room, the jack-screws are supported on and bolted to two I-beams the length of the furnace, placed immediately beneath, and parallel to, its sides. These I-beams are bolted to, and supported by, three steel axles equipped with small flanged wheels, the whole constituting a carriage, which runs freely on a track. The entire apparatus is movable or rigid at will, for the wheels are easily braced, if the tension of the tightened jack-screws does not serve to hold the whole in position.

The advantages of this design will be at once apparent to those who have had practical experience in barring furnaces provided with stationary iron bottoms. It is well known that the time occupied in cleaning and preparing a frozen furnace for active service is lengthened by the necessity of working in a confined place where the temperature is uncomfortable, and that in such case the debris must be removed from the bottom of the furnace before the false-bottom of fire-clay, coke-breeze, etc., can be repaired or replaced. Then, too, this superimposed bottom is almost invariably destroyed when the iron plate is pried off the supporting jack-screws, and no renewing is practicable until the plate is once more installed beneath the furnace.

Results from the working of the Grand Prize installation demonstrate that the time lost by freezing up is ordinarily reduced over 50 per cent, and with good fortune more economy is possible. The work of barring down and renewing the false-bottom proceeded simultaneously. The jack-screws had a play of 10 ins., and the false bottom was built 9 ins. in depth, including firebrick cover.

* Paper read before the American Institute of Mining Engineers.

A TELEPHONE FOR USE IN MINES.

The telephone, so far as it has heretofore been introduced in mines, has fully proved its usefulness. It is true that some of the forms first introduced were defective, because the designers did not fully appreciate the conditions under which the work in the mines had been carried on. A process of general development, however, has gone on and many improvements have been made. In the accompanying illustrations we exhibit the apparatus connected with a new telephone constructed especially for mines,

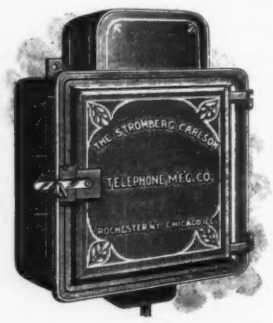


FIG 1.—INSTRUMENT CLOSED.

which, we think, many of our readers will find of interest. The instrument shown is a development due to experience, the makers having been pioneers in this work, and having learned by actual practice what additions or modifications were needed. These in-

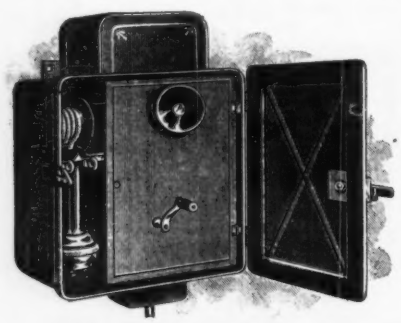


FIG. 2.—READY FOR USE.

struments are made by the Stromberg-Carlson Telephone Manufacturing Company.

Fig. 1 is a view of the instrument closed. Fig. 2 shows the outside door open, with the telephone ready for use. Fig. 3 shows the inner door open, dis-

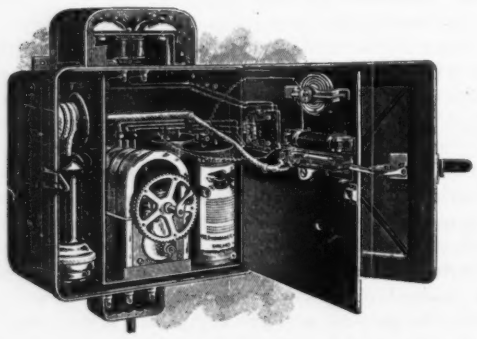


FIG. 3.—DETAILS OF APPARATUS.

closing all the apparatus. The case in which the apparatus is mounted is weather-proof, practically air-tight, made of cast iron and treated with an insulating gas and acid-proof paint. All the aparatus with the exception of the receiver is mounted in this inner case, as shown in Fig. 2. The ringer, which is provided with a 4-in. gong, is mounted in the dome at the top of the instrument, provision being made for the sound to be heard at considerable distance; and it is also so constructed that meddlesome hands cannot interfere with the mechanism of the bell. The hookswitch, induction coil and lightning arrester are mounted on the inner case door, as shown in Fig. 3. All the wiring is done with the best grade of copper wire, rubber insulated, experience having shown that this is the only kind of wiring that is satisfactory for such places as these in which mine instruments are usually installed. A device is also provided for taking up the slack of the receiver cord, this being shown at the left of the instrument in the small space provided for the receiver. This prevents the cords from getting caugth in the door when the receiver is placed on the hook, and thus reduces cases of short circuit from this cause. The outer door closes against a rubber gasket, fitted into a groove in the case, which serves to make the instrument practically air-tight.

COAL IN NEWFOUNDLAND.—The Newfoundland Legislature has passed a resolution authorizing an expenditure for a thorough scientific exploration of the coal-fields of that island.

ABSTRACTS OF OFFICIAL REPORTS.

Franklin Mining Company, Michigan.

This company operates the Franklin and Franklin Junior properties in the Upper Peninsula of Michigan. Its report covers the year 1902.

The financial statement shows receipts as follows: Cash and copper (since sold), January 1, $109,215; copper produced and sold in 1902, $526,800; silver sold, $949; received on account of copper to be delivered, $11,000; total, $647,965. Expenses at mine were $521,432; smelting, freight and miscellaneous, $76,838; total, $598,270, leaving a surplus of receipts for the year of $49,695. Total assets on December 31 were $232,104; liabilities, $132,046; leaving a surplus of $100,058 forward to current year. The quantity of copper on hand at the close of the year was 823,613 lbs.

At the Franklin Mine 644 ft. of development work was done and 109,097 tons rock hoisted. At the Franklin Junior the report shows 147 ft. shaft sinking and 5,366 ft. leads and cross cuts. The average cost of shafts was $14.39 per foot; of drifting, $7.71 per foot. The total rock sent to the mill was 315,689 tons. The average cost per ton was $1.64; the cost of stamping being 28.81 cents per ton. The product was 8,352,020 lb. mineral, from which 5,237,060 lb. fine copper was saved. The average yield of copper from rock stamped was 16.88 lb. per ton, or 0.85 per cent.

The copper sold during the year was 4,435,527 lb., the average price realized being 11.88c. per pound.

The directors' report says:"The amount of mineral produced during the past year increased over the previous year as anticipated 1,480,041 lb., we running to the full extent of our three heads of stamps, and we could easily have kept one more head busy, at least part of the time, had it been installed and in working order. The amount stamped was 315,687 tons, and the product was 5,237,460 lb.

"The old Franklin still holds out, furnishing nearly 10,000 tons of rock per month, and promising to do so for a long time to come. We are exploring from different parts of the mine hoping to strike some of the rich bnches which the Quincy was so famous for in years gone by, and are working to that end in the mine, the conglomerate east of the Pewabic Lode not having been found of value. The Pewabic Lode is looking well, and promises well for the future. Franklin Junior is seemingly all right with good looking rock ahead of us for stoping, and promises better for the future, particularly in the southerly part of the mine, and also below the 15th level in the drifts; and the mine on the whole, the agent says, is looking better than ever before.

"It will be seen that even with copper at the low rate of a trifle over 12c. we have made a little money, and at 13c. or over the prospects for a good profit are very good. We are extending our drifts south at the 7th and 14th levels to prove up the ground in that locality, in view of putting in another shaft there, and are negotiating for another head of stamps in the mill, for which the foundation is already in place."

Stratton's Independence, Limited, Colorado.

The report of this company, the issue of which has been somewhat delayed, covers the year ending June 30, 1902. The directors' report says: "The revenue account of the mine, which was audited on the spot, shows the sales of ore to have realized £68,888. A further amount of £437 was added to the ore in stock, making a total of £469,325, as the gross value of the output for the year. The quantity of ore sold during this period was 96,173 tons of 2,000 lb. Adding the royalty from waste heaps and sundry rents, and deducting freight and treatment, and working expenses, the revenue account at the mine resulted in a profit of £129,355, the expenses including development work in the mine, and improvements to buildings, plant and machinery. After the further deduction for London expenses the amount carried to the credit of profit and loss account for the year was £125,035. This profit, added to the balance brought forward from the previous year's account, made a total of £226,525, from which two quarterly dividends at the rate of 20 per cent per annum were paid in July and October, 1901, and a third quarterly dividend at 10 per cent per annum was paid in January, 1902, bringing up the dividends received by the shareholders since the incorporation of the company, to a total of £754,172, leaving a credit balance of £97,399 carried forward to the current financial year. This cash reserve has been increased from profits made during the succeeding ten months to end of April last. The present balance at our London bankers is £17,821, and at our bankers in Colorado £26,332, in addition to which we have £100,743 lent out at good interest on sound security. The company has met practically all its liabilities to date with the exception of income tax on the current year's profit. The policy of providing the entire expenditure on the equipment and development of the mine before declaring profits has been maintained.

"It will be seen from Mr. Hammond's reports, appended hereto, that the development work generally, and the explorations at the lower levels have been continued vigorously, and that thre has been a considerable expenditure in heavier pumping plant, both in the mine and at surface, necessitated by the increase of water which has hampered our explorations at the 1,400-ft. level. The directors' expectations as to the vitality of the mine, expressed in their last annual report, may be said to be justified by the results since obtained. The continued extensions on the old ore-bodies, the opening up of new ore-ground in the upper and middle zones of the mine, coupled with the proved maintenance of the three principal veins of the mine as the explorations have progressed in depth, have all contributed to the output of ore on a large scale. The masses of low-grade ore exposed by the later developments have, in a sense, made the gradual exhaustion of the richer portions of the old ore-bodies less apparent than would otherwise have been the case. It should, however, be remembered that until we strike new ore-bodies of higher grade and greater extent than the recent discoveries and extensions have exposed, the ore reserves in the mine will not be on a scale commensurate with the capital of the company. The reasons for the course which the directors advised, and which was adopted at the last general meeting, with regard to the company's cash reserve have not lost their force. The directors are still of opinion that until the ore reserves in the mine are greatly increased, or the time arrives for inaugurating a new departure by investing any part of the company's funds in other sources of profit, the cash reserve should be allowed to go on accumulating and not be dispersed in payment of dividends. The directors are confirmed in this opinion by the views of important shareholders with whom they have been able to confer on the subject.

The mine manager, Mr. Cornish, reported a short time ago that the dump contained approximately 535,000 tons, averaging 3.5 dwt. gold to the ton. Further experiments with this ore have been made, without so far attaining the stage of commercial suc-

cess. The directors have not, however, relaxed their efforts in this direction, and they are now arranging for an experimental test to be made in Colorado with a patented process of great promise with the view to its adoption, if successful, on the dump ore, and also on the lower grade ores in the mine, which are not at present capable of treatment by the ordinary methods.

"It will be noted that a sum of £2,147 was expended during the year in connection with the action against the late Mr. Stratton's Estate, which was commenced in January, 1903."

The report of Mr. John Hays Hammond, above referred to, is as follows: "During the past year we have mined 230,699 tons of crude ore, which yielded, after sorting, 96,173 net dry tons. The sorted ore, designated shipping ore, was sent to the reduction works. The gross recovered value of the shipping ore was $2,274,108. The net return to the company, after deducting freight and treatment charges, was $1,510,683. The average value recovered per ton of crude ore was $9.86, and the net value received by the company was $6.55 per ton of crude ore. The gross assay value was $2,812,220, of which $538,112 was dump loss. Therefore, average value per ton of crude ore was $12.10. This shows, as was predicted, a great falling off in the value of the ore since the last annual report.

"The operating expenses for the year were $965,186, or $4.18 per ton of ore mined—which shows considerable reduction compared with previous years. Charged against the operating expenses is the sum of $293,245, the amount expended in development work. This is $1.27 per ton of crude ore. As you see, there is but a small margin, $2.37, between profit and loss, and it is only by exercising rigid economy, by carefully determined plans of development, and by working on a large scale, that this profit is possible.

"The development work has been pushed energetically during the past year. The main shaft has been sunk 264 ft., making its present total depth 1,430 ft. It is not proposed at present to sink this shaft deeper. We shall be guided as to this policy by the result of the next few months' development in this horizon. Considerable drifting and cross-cutting has been carried out both in the lower horizon of the mine and in the southern area. The total amount of development work has been: 1,521 ft. raises; 160 ft. winzes; 11,738 ft. drifts and cross-cuts.

"The southern territory has been prospected thus far by drives and cross-cuts from the third and seventh levels. The aggregate amount of this development is 3,475 ft. In addition to this some work has been done in the vicinity of the Washington shaft. While this work is inadequate to conclusively determine whether or not payable ore-bodies exist within this territory, it has, however, as yet failed to discover any favorable indications of the mineralization of this section of the property. We intend to carry out in the near future further explorations within this territory, but the developments thus far made do not warrant sanguine expectations on our part.

"From the main shaft, drives and cross-cuts, aggregating 2,505 ft., have been run upon the 1,150 and 1,100-ft. levels. These levels have almost reached our northern boundary, the Portland property. We have as yet found no payable ore, and indeed, have found but slight evidence of mineralization at this horizon. The outlook for this section of the property is likewise not encouraging, but, to preclude the possibility of there being ore-bodies undiscovered within this part of the mine, we propose to continue developments as far as commercial considerations justify.

"In my cable of June 20, from Victor, I stated that the ore reserves were nearly depleted; that the remaining ore was in pillars, shells of ground and small irregular blocks. Reference to the mine maps on file in the London office will make this explanation clear, and will show the impracticability of making any approximate estimate of the ore remaining in the mine. The ground from which we are at present extracting ore is in the shells and pillars referred to and from small veins containing bunches of ore, the extent of which do not justify any systematic development with a view of making an accurate technical estimate. The working of ground of this character requires the frequent change of the stoping faces, so that an estimation of the amount of ore remaining at any of these points is purely a matter of conjecture. The accurate determination of the grade of ore exposed in the face of these small bodies does not necessarily give the true value of the bunches as a whole. The stoping of bodies of this character naturally give rise to great fluctuations in the value of the ore extracted, as is shown in the irregularity of the monthly production of the property."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Western Australia. Report on the Phillips River Gold-field. By A. Montgomery. Perth, W. A.; Government Printer. Pages, 68.

The Story of a Grain of Wheat. By William C. Edgar. New York; D. Appleton & Co. Pages, 196; illustrated. Price, $1, net.

Western Australia. Statistical Register, Part IV. Interchange. Compiled by the Government Statistician. Perth, W. A.; Government Printer, Pages, 250.

Organization d'un Service de Havage Mecanique dans une Mine de Honille. By M. A. Gennes. St. Etienne, France; Societe de l'Industrie Minerale. Pamphlet, 12 pages.

Ore-deposits near Igneous Contacts. By Walter Harvey Weed. New York; reprinted from the *Transactions* of the American Institute of Mining Engineers. Pamphlet, 32 pages.

The Michigan Engineer. 1903. Edited by F. Hodgman. Climax, Mich.; Published for the Michigan Engineering Society by F. Hodgman, Secretary. Pages, 196; illustrated. Price, $1.

Ore-deposition and Vein-enrichment by Ascending Waters. By Walter Harry Weed. New York; reprinted from the *Transactions* of the American Institute of Mining Engineers. Pamphlet, 8 pages.

Queensland. Annual Report of the Under-Secretary for Mines for 1902. A. R. Macdonald, Under Secretary. Brisbane, Queensland; Government Printer. Pages, 184; with maps and illustrations.

BOOKS REVIEWED.

A Treatise on Metalliferous Minerals and Mining. By D. C. Davies. Sixth edition, thoroughly revised. London, 1901; Crosby Lockwood & Son. Pages, 550; illustrated. Price, $8.

The treatise is designed, as the author states in the preface to the first edition, "to describe in a concise and systematic manner, the conditions under which metals and metallic ores are found in the different countries of the world." This work first appeared in 1880, and has ever since been generally and tacitly accepted as a standard work of reference on economic geology. The appearance of the sixth edition affords an opportunity to express in regard to this work some of the grievances of the reviewer, who, as a teacher and economic geologist, has tried faithfully and with charity to make use of it.

Only that portion of the book which deals with the subject of economic geology (pages 1 to 324) will be taken up in detail. All italics are the reviewer's.

The metals discussed are placed in two groups—the *noble metals*—gold, silver, platinum, iridium and palladium; and the *useful metals*—copper, tin, lead, zinc, iron, nickel, mercury, bismuth and tellurium.

On page 4 the author says: "Metalliferous minerals occur in nature in two distinct forms: 1st. Native, when they are found *unalloyed*, with other and especially *non-metallic* substances. . . . 2d. Mineralized or associated with other minerals. . . . As we shall see, the latter, *except in the case of the noble metals*, is the common mode of occurrence. In this state they are known as 'ores.' . . ."

In making these statements the author overlooks several things. In the first place combinations of metals with non-metallic substances are not *alloys*, as is implied in the first statement. The fact is overlooked also that silver, one of the noble metals, usually occurs, not in its native state, but in combination with sulphur, chlorine, arsenic, antimony, or other elements; and that tellurides of gold are exceedingly important and quite common compounds of that metal—notably at Cripple Creek and in Boulder County, Colorado, and in the Kalgoorlie District of Australia. Tellurides of gold are also known in many other gold regions. In his generalization regarding the occurrence of the base metals the author also overlooks the fact that in 1900 almost one-seventh of the world's copper supply came from the native copper ores of the Lake Superior region, and that native copper is found in many places.

The statement that the metals in combination "with other minerals" are known as "ores" is also misleading; to be sure, they are known as ores, if they occur in sufficient quantities to be mined with a profit; but so are the native metals, such as gold, silver and copper, when they occur in veins or deep bedded deposits in sufficient quantities to be profitably mined, as truly ores (so far as the prospector is concerned) as if they were combined with non-metallic substances.

One of the author's great stumbling blocks in this work is his propensity towards broad generalizations. On page 6 this statement is made: "With the exception of the metal iron, more rarely copper, and *occasionally* one of the noble metals, all of the metallic minerals we have to consider are found in the strata from the *Permian downwards.*"

An occasional exception to the rule regarding the occurrence of the noble metals certainly seems inadequate when one remembers that the mother lode of California is in rocks of Carboniferous, Triassic, and Jurassic ages, and that up to the present time a very large proportion of the world's gold has come from gravels of Pleistocene and recent age.

The statement that the ores occur "in the strata from the Permian downward" is misleading, because there are many important ore-deposits which are not in stratified rocks at all, but are in rocks of igneous origin, and many of these are of later age than the Permian.

On page 6 also the statement is made that the great mountain chains of the world have "a general direction from NE. to SW.," and as an example of these ranges the "Rocky Mountains, which extend from British Columbia, through *California*, Utah, *Nevada*, Arizona and Mexico," are cited. The Rocky Mountains do not extend through California and Nevada, and instead of having a northeast-southwest trend, they have a northwest-southeast trend. Other equally inaccurate statements regarding geography are made.

On page 7, after enumerating various great mountain systems, the author concludes with the sweeping statement that "it is on these mountains, and in the valleys and ravines by which they are traversed . . . that we shall find . . . all the great deposits of metallic minerals of the world." The erroneousness of this statement becomes evident when the fact is pointed out that the Lake Superior iron and copper regions and the Mississippi Valley lead and zinc regions of North America, three of the most important ore-producing localities of the world, are in comparatively level regions, for the most part, far removed from the mountains.

On page 9 is another of the author's general rules: "Most fissures that are charged with metallic ores have a general east and west direction, which varies, however, about 45° on either side." This statement is entirely misleading, for, while the veins in any

given locality may have an east-west, a north-south, or some other trend, veins in general, trend in any and all directions, and it is, therefore, impossible to formulate any rule in regard to their trend that will have more than local application.

The author's definitions of terms are likewise misleading and inaccurate, as will be seen by an examination of the definitions of *irregularly stratified* and *contact* deposits, page 26, and *contact deposits, network of veins* and *disseminated* ores on pages 30 and 31.

It should be remarked that in this "treatise on metalliferous minerals" the importance of replacement deposits, of the secondary concentration and enrichment of ore-bodies and of their superficial alteration is almost entirely neglected. The latter is mentioned, but its importance in mining operations and its relation to the occurrence of ores is not brought out.

In that portion of the volume dealing with the occurrence of the individual metals there are fewer inaccuracies than in the first three chapters. Misleading statements are still plentiful, however.

In the first line under the subject of gold, on page 32, the author says: "Gold does not often occur in nature in a mineralized form. Rarely, as in Transylvania, it is found mineralized by association with tellurium." The statement that gold *rarely* occurs in combination with tellurium is misleading, for, as a matter of fact, tellurides of gold are a very important source of that metal, and cannot be disregarded in any general treatment of the occurrence of gold in commercial quantities.

On page 34 the statement is made that gold-bearing lodes "traverse the older metamorphic rocks, principally those of Cambrian and Laurentian age." With this statement may be contrasted the following facts concerning the occurrence of gold in the United States: The gold deposits at Mercur, Utah, are in Carboniferous strata; the Comstock Lode, of Nevada, is in rocks of Tertiary age; the Mother Lode, of California, is in Carboniferous, Triassic and Jurassic rocks, and was formed in late Jurassic or post-Jurassic times. It is needless to multiply exceptions to this so-called rule.

The author's geographic inaccuracy may be inferred from quotations from page 50 concerning the Rocky Mountains and the Pacific Coast as follows: "*This mountain chain* (the Rocky Mountains) consisting of its great central ridge of the *Sierra Nevada*, with the parallel ridges of Utah on the east and the coast range of California on the west, etc.," and further, "It was on the west side of the *Coast* or *Californian* range of mountains . . . that gold was found. . . ." The inaccuracies of these statements are too evident to require comment.

A number of erroneous conclusions regarding the occurrence of lead ores are drawn. The horizons at which the lead ores of the world occur are correlated with the geological formations of England. The readiness and inaccuracy with which these correlations are made may be inferred from the following statement from page 259 concerning the age of the Leadville, Colorado, silver-lead deposits, which are spoken of as the California Gulch deposits. The author says: "The limestones and underlying schists are for the most part metamorphic, and there can, I think, be no difficulty, *from the presence of porphyry above and the quartzites and gneiss below*, in recognizing their position as the equivalent of our (the English) *Cambro-Silurian Llandeilo* beds."

Such correlations as this are worse than valueless, and such geologic reasoning is scarcely to be expected in a volume printed at the beginning of the twentieth century.

Under the subject of lead on pages 209-210, among other minerals, clausthalite, dufrenoysite, telluride of lead and foliated tellurium are listed as varieties of galena. Of these minerals clausthalite is lead selenide; dufrenoysite is lead sulpharsenite; lead telluride has the composition PbTe, and foliated tellurium is a telluride of lead and gold, often containing some copper, silver or sulphur. Not one of the above mentioned minerals is a variety of galena.

Under the subject of iron, page 300, the author says of the iron ores of the Lake Superior district, that they occur "as a vast succession of thin beds," that "generally speaking" the deposits "are mixed with much siliceous matter," and that the "beds are traversed by joints that cut the ore into square blocks." These are erroneous statements when applied, as they are, to the Lake Superior region as a whole. Most of the ores that are mined in that region occur as great masses and not as thin beds; they are not mixed with much silica—most of the ores containing less than 5 per cent of that substance—and they are not generally cut into square blocks by joints.

The part of the volume dealing with the occurrence and distribution of ores is closed with chapter 31, which is devoted to a brief discussion of bismuth, nickel, platinum, iridium, palladium and tellurium.

The care with which this "thoroughly revised and much enlarged" edition has been revised may be inferred from the following: In speaking of the early gold workings in California Gulch, near the present town of Leadville, Colorado, the author says, in the fifth line from the bottom of page 258, of the fifth edition of this work (as published in 1892) "about sixteen years ago it was the busy scene of rich surface gold mining operations. . . ." The same statement appears in the same line of this same page of the sixth edition of the book, published in 1901. The gold workings of California Gulch reached their maximum development about 1861, from which it is inferred that these lines were written about 1877, and have never been rewritten. Regarding the discovery of lead carbonates in the Leadville region (which he designates as California Gulch) the author says at the top of page 259 of the fifth edition (1892): "The presence of carbonate of lead in these heavy stones was first recognized *about three years ago* by Mr. A. B. Wood. . . ." The same statement, word for word, occurs in the first three lines at the top of page 259 of the sixth edition (1901). As the discovery referred to was made in 1874, this statement must have been written about 1877, but it has escaped correction through the various *revised* editions of the book.

At the bottom of page 50 of both the fifth and sixth editions the following statement appears: "The present magnitude of alluvial gold mining in California may be inferred from the statement that in 1873 there were 775 mining ditches situated in 25 counties. The ditches were of an aggregate length of 4,863 miles. . . ." At the bottom of page 51 (sixth edition) is the following contradictory statement: "Alluvial mining in California has now almost entirely been superseded by quartz mining. . . ." These errors are of little importance in themselves, but they indicate the nature of the revisions that the various editions of the book have had.

Out of some 40 dated references given on pages 1 to 324, seventeen bear dates earlier than 1877; eleven are to papers published in 1877; seven are to papers published in 1878; one is to a publication of 1889; one is to a publication of 1891, and three are to papers published in 1900. A greater number of valuable papers discussing the origin and occurrence of ore-deposits have been written by both European and American geologists during the last decade than have appeared in any other similar period. The contents of Mr. Davies' book do not indicate that the revising author was even aware of these publications, to say nothing of the facts contained in them.

Chapter 32 discusses the "discovery and proving of mines." In this chapter the generalizations made in the preceding part of the book are summed up, and some new ones are added.

It is stated that the different metals occur in different *zones;* that of these zones tin occupies the lowest, copper comes next, and gold occupies the next zone above copper, "its place being near the junction of the lower with the Upper Cambrian Strata." Silver, lead and zinc, are not quite so easily placed, but their *zones* are fixed with a fair degree of accuracy. Iron, being a sort of free lance, and no respector of zones, is left out of this *resume.*

The horizons at which the metals (excepting iron) occur over the world are correlated with, and made to fit into the geological column of Great Britain; in order to search intelligently for ores in the rest of the world it behooves us, therefore, to familiarize ourselves with the geological column of Great Britain.

In Chapter 32 we are told "that gold is widely disseminated throughout the Potsdam sandstone of western North America," in spite of the fact that in most of the gold districts of Western North America the Potsdam sandstone is not known to exist. We are told also that the great silver deposits of Western America occur at the horizon of the *Llandeilo* and Arenig strata of England; that the "older rocks" form "the elevated and rugged portions of the globe"; that all search for ores (excepting iron) should be limited to these regions, and that they follow "all over the world" a general north-east to southwest direction. We are told also in this chapter that the prospectors of the Western United States soon learn that "the most persistently productive metalliferous lodes run, roughly, *east and west,*" and along with all these generalizations we are told that "a little geological knowledge" is a good thing to have.

There is a general tendency among miners, and especially among prospectors who do not have a good knowledge of geology, to formulate general rules concerning the occurrence of the ores for which they search. Such rules are usually based on personal experience, and are, therefore, usually only locally applicable; consequently, when the men who work by such rules of their own making find themselves in strange regions they are greatly handicapped by those same rules. It is, therefore, of the utmost importance that treatises on the occurrence of ores, which are largely designed for the use of prospectors and miners (that great class of men upon whose efforts so much of the wealth of the world depends) should lay down principles that are based on scientific truths.

Books intended for prospectors as well as for students, should point out the difficulties in the way of formulating general simple rules regarding the occurrence of ore-deposits. These men should be especially warned against such rules as the "general east-west direction of lodes," the "general occurrence of gold in the Potsdam sandstones," and others of like character.

Instead of guarding against such generalizations this work of Davies encourages them, and lays down many false rules, the erroneousness of which the prospector cannot be expected to know. It is, therefore, impossible to estimate the harm that may result from such a work as Davies' treatise when it falls into the hands of men who will be only too ready to accept as true the erroneous generalizations contained in it. Imagine a prospector or miner along the Mother Lode of California, for instance, faithfully following the suggestion that the gold-bearing veins run east and west; or the prospector in the Cripple Creek district earnestly searching for Potsdam sandstone cut by east-west veins.

Owing to lack of space only a few of the errors of the first 324 pages are noted. It is remarkable that six editions of this work should have been published.

The last part of the volume, pages 325 to 490, inclusive, is devoted to a discussion of the methods of mining, the dressing of ores and sundry allied subjects.

This part of the book is well written; an extensive field is covered, and the treatment is, therefore, necessarily brief. The closing chapter is devoted to a discussion of the management of mines, the common causes of failure in mining enterprises, and their remedies. This is an excellent chapter and can be read with much profit by many who have to do with the management of mines.

It is to be regretted that the author did not confine his entire treatise to the subjects with which he was familiar.

J. F. NEWSOM.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

PHOSPHOR-TIN FREE OF DUTY.—Phosphor-tin, an article made by adding a small percentage of phosphorus to tin, being a species or form of tin, is entitled to free entry under paragraph 683, act of July 24, 1897. The addition of the phosphorus not having changed its name, character or use, and the article so produced, being tin and nothing more, is classifiable as tin.—Appeal of F. W. Myers & Co. from Collector of Customs at Plattsburg, N. Y.; Board of General Appraisers.

INTEREST CONVEYED BY "WORDS OF INHERITANCE."—Where an instrument sets forth that the owner of certain coal does "grant, bargain and sell" such coal, and adds words of inheritance, it is to be presumed, where the contrary intent does not affirmatively appear, that the parties intended to vest in the purchaser the entire ownership of the coal in the land described.

An instrument which is in terms a conveyance of all the coal in and under and upon a tract of land, with right to mine and remove the same, is a sale of the coal in place, whether the sale is for a lump sum, or for a certain price for each ton mined, though the coal under the surface is to be taken out within a fixed time.—Hosack v. Crill (53 *Atlantic Reporter*, 641); Supreme Court of Pennsylvania.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Labor at the Carborundum Company's Works.

Sir.—In the JOURNAL of May 16 the following note appeared: "Machinists in the employ of the Carborundum Company, Niagara Falls, went on strike recently, thus closing one department of the plant. The men demand a nine-hour day."

As this item does us manifest injustice, we desire to make a statement of the actual facts in the case.

The Carborundum Company employs about 300 workmen. As our factory is the only one of its kind in the United States, there have not been enough of our employees to form a Carborundum Workers' Union, and up to the present time the only union men in our employ have been our machinists and carpenters. Our electrical furnaces operate continuously, 24 hours per day. In this respect we are like almost all of the other electro-chemical industries at Niagara Falls, and, like the other plants, our working day is 10 hours.

On April 26 we received a form of agreement from Machinists' Union No. 316, of Niagara Falls, which we were asked to sign as the condition of having our men continue to work for us. This agreement provided that we should employ none but union machinists and members of Local Union No. 316. It provided that we could employ only a certain number of apprentices, and that, commencing May 1, our hours for work should be nine instead of ten, without any reduction in the daily wages. It also provided for an elaborate system of over-time rates, and the submission of disputes to arbitration committees, etc.

As a matter of operating economy, we could not permit eight men out of 300 to have a nine-hour day, and expect the other 292 men to work ten hours. As a matter of principle, we could not bind ourselves to employ only such men as might be offered to us by an irresponsible body, and we therefore refused to sign the agreement.

The result was that on May 1 five of our eight men struck, and our works have been picketed ever since. We have picked up new men from time to time, but the majority of them have been frightened away by the threats of the pickets. The necessary repair work of the shop is being done by the men still at work. New work is being sent outside, and except for the annoyance of having our property surrounded by pickets, we have not experienced any serious results from the strike.

F. W. HASKELL,
President Carborundum Company.
Niagara Falls, N. Y., May 26, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Celestite.—Can you inform me as to the price and market for a pure, white, crude celestite?—P. A. O.

Answer.—Strontium sulphate (celestite) in the crude state is worth 2 to 3c. per lb., according to purity. Consumption is small, being confined chiefly to the preparation of a powder used in fireworks to give a red light.

Iron Ore in Norway.—1. Is a deposit of iron ore, estimated to hold 500,000,000 tons above sea level, situated on Western coast of Norway, close to harbor and all year open sea, the average tests of which ore so far give: Iron from 40.81 to 48.69 per cent; manganese, 0.94 to 7.5; phosphorus, 0.155 to 0.333; sulphur, trace to 0.06 per cent; titanium, only small trace—is such a deposit to be considered a commercial proposition, and who would be the parties in the United States most likely to interest in the matter?

2. Has the Edison process proved a success, and are the Dunderland iron ore deposits being worked at present?—P. A. A.

Answer.—1. On the basis you state such a deposit might be a good commercial proposition; though it is a low-grade ore, with rather a high prportion of phosphorus. It would be, at least, worth examination. Of course, local circumstances—such as cost of mining, possibly of improving the ore by concentration, washing, or other treatment, supply of labor, etc.—would have to be taken into consideration. English investors would be more likely to take it up than American. Only a concern having works on or near the Atlantic Seaboard—like the Pennsylvania Steel Company—would be likely to look at it here.

2. There is no information attainable as to the success of the Edison concentrating process with the Dunderland iron ores.

IRON ORE IMPORTS OF GREAT BRITAIN.—Imports of iron ore into Great Britain for the four months ending April 30, were 2,161,086 long tons, of which 1,754,747 tons were from Spain. This compares with 2,018,029 tons—1,711,074 tons being from Spain—in the corresponding period in 1902; showing a total increase of 143,057 tons, or 7 per cent, this year.

SINKING THROUGH A QUICKSAND.—A new shaft for the Minnesota Iron Company, near Chisholm, on the Mesabi Range, is being put down through quicksand. The method of sinking is one patented by Capt. Hoar, of Negaunee, Mich., and is described as follows: Two heavy sets or shaft frames cased on the outer side with steel are started and outside of them long steel-lined lath are sunk downward. These lath fit reasonably tight and can be diven and jacked down independently of each other so that when obstructions are met they may be surrounded. The sand and other material inside these lath are taken out and the sets within are driven down. The process is repeated to the bottom. The shaft is being sunk at the rate of 2 ft. per day, and the depth to rock is 90 ft.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

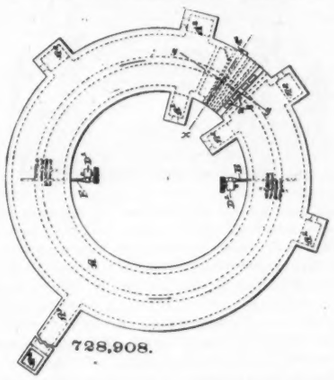
Week Ending May 26, 1903.

728,831. BRICK-CLAY CRUSHER-ROLLS.—Julius H. Bach, Chicago, Ill. An apparatus for crushing clay and removing the stones therefrom, comprising a supporting-frame; a pair of coacting crusher-rolls.

728,849. APPARATUS FOR ROLLING PLATES OR SHEETS.—Charles W. Bray, Pittsburg, Pa., assignor to the American Tin Plate Company, Orange, N. J. The combination with a mill, of feed mechanism arranged to feed the metal thereto, a receiving-table co-operating with the feed mechanism, connections for changing the level of the table and the feed mechanism relatively to each other, feed-tables on opposite sides of the receiving-table, and stop mechanism arranged to stop the bars on the receiving-table coming from either direction.

728,889. CALCIUM-CARBIDE PACKAGE.—John Ewing, Jr., Richmond, Canada. A package comprising a closed porous casing for containing the carbide, a covering of impermeable rupturable material and means connected with the cartridge for rupturing the outer casing.

728,908. MEANS FOR TREATING ORES.—Frederick D. Gross, Denver, Colo., assignor of two-thirds to Timothy Goodwin and the Colorado Iron Works Company, Denver, Colo. In means for treating ores, the combination of means


728,908.

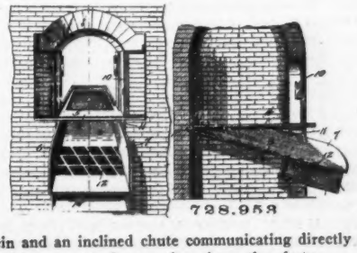
for carrying ore, a series of rabbling-blades inclined relatively to the path of ore movement, a portion thereof being of inclination opposite that of the remainder, and means for replacing blades of similar inclination with blades of opposite inclination whereby all blades in the ore-path may be of same inclination.

728,914. APPARATUS FOR MAKING SULPHURIC ACID.—Nicholas L. Heinz, Lasalle, Ill. A Glover tower, an acid-chamber, and flues for conducting the gases from the tower to the chamber, said flues being arranged to enter the chamber near the front end from opposite sides, at different levels and transversely to the length of the system whereby the gases passing through the flues into the chamber are caused to enter in opposite directions, at different levels, and transversely to their general course through the chamber.

728,918. PROCESS OF PRODUCING PAINT-OIL.—Edward C. Holton, Cleveland, Ohio, assignor of one-half to the Sherwin-Williams Company, Cleveland, Ohio. A step in a method of producing paint-oils, consisting of treating blown oils with sulphur chloride in solution in a hydrocarbon.

728,940. DEVICE FOR EMPTYING PANS OF CLAY-MILLS.—Rex Kyler, Lockhaven, Pa. In a clay-mill, the combination with the revoluble pan, of a conveyer-frame having a traveling belt, a scoop and a shear-off secured to the inner end of said frame, said shear-off being curved upward and having an inclined shearing edge above the belt.

728,953. COKE-OVEN.—George M. Miller, Uniontown, Pa. In a coke oven, the combination with an inclined floor

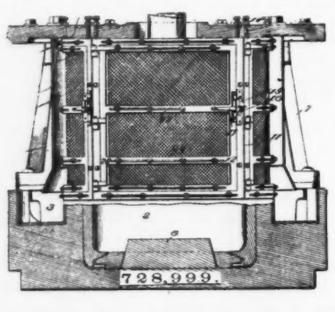

728,953

therein and an inclined chute communicating directly therewith, of a movable floor-section above the chute.

728,955. FLUID-COMPRESSOR.—Garry V. Mitchell, Elmira, N. Y. A fluid compressor comprising a cylinder having a compression-chamber, a cylinder-head having a fluid-inlet chamber and a valve-housing extending across the cylinder-head, a piston within the compression-chamber, a cylindrical rocking or oscillating, main inlet-valve having a lever-arm and mounted in the valve-housing, an extensible pitman connected with the lever-arm of the main inlet-valve, means for operating the piston and pitman in unison, and a detent device associated with the cylinder and adapted to be controlled by the fluid under pressure in the receiver, or distributing-pipes, and to arrest the movement of the main inlet-valve and keep it closed without stopping the movement of the pitman, while the predetermined pressure in the receiver, or distributing-pipes is exceeded.

728,991. PROCESS OF ENRICHING GAS.—Frederick W. C. Schniewind, Everett, Mass., assignor to the United Coke & Gas Company, Charleston, W. Va., and Philadelphia, Pa. In the manufacture of gas in closed externally-heated retorts, a method of improving its quality which consists in separating the richer and poorer gases generated, subjecting a body of tar containing benzol and its homologues to fractional distillation to volatilize and separate from other volatile matters the valuable illuminates and during the stage of the distillation in which the benzol is volatilized forcing through the still some of the richer fraction of gas generated in the retorts, and finally mixing the said gas and benzol removed from the still with the said richer fraction of gas.

728,999. STAMP-MILL.—Joseph A. Shields and James W. Shields, Lake Linden, Mich. In a stamp-mill, and in combination with the mortar, a screen surrounding the motor and composed of sections or grates hinged at one edge and adapted to swing horizontally at the opposite edge.


728,999.

729,008. ORE-ROASTER.—Henry M. Sutton, Walter L. Steele and Edwin G. Steele, Dallas, Tex. In an ore-roaster, means for creating a current of air, means for introducing ore into said current, a heating-chamber, means for imparting a rotary motion to said current within the said chamber, means for heating the air and ore, and means for effecting an expansion of the air to precipitate the ore within said chamber.

729,009. PROCESS OF ROASTING ORES.—Henry M. Sutton, Walter L. Steele and Edwin G. Steele, Dallas, Tex. A process of roasting ores consisting in suspending the particles thereof in a moving body of air and subjecting them to heat and rotary motion during an expansion of the air to permit a precipitation of the ore by gravity.

729,092. DOUBLE-HEARTH HEATING-FURNACE.—Peter Patterson, McKeesport, Pa., assignor to National Tube Company, Pittsburg, Pa. A heating-furnace having a heating-chamber, a plurality of hearths in said chamber one directly above the other, and air and gas ports leading to said chamber and arranged so as to provide the products of combustion and deliver the same at substantially equal temperatures into the space above each of said hearths.

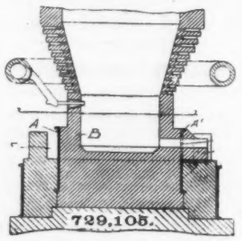
729,099. MANUFACTURE OF PIPES.—Joseph K. Smith, Pittsburg, Pa.—In a machine adapted for the manufacture of wrought iron pipes, the combination, with a suitable frame, of means for supporting and revolving a pipe, means for forming a bearing-surface or flange on an end of the pipe comprising a carrier, a roll mounted on a laterally-adjustable support thereon located at the rear of the end of the pipe to be flanged, a longitudinally and laterally adjustable roll on the carrier located in front of said end, means for independently moving one of said rolls both longitudinally and laterally on said carrier and the other roll laterally thereon relatively to the axis of the pipe.

729,101. FURNACE FOR HEATING METAL SHEETS.—John Stephens, John G. Danks and Ross J. Beatty, Muncie, Ind. A furnace for heating metal sheets comprising a heating-chamber, and endless conveyer arranged to travel through said chamber, said conveyer having fingers fixed to the links thereof and set so as to stand upright when within the furnace, and fit upon their upper ends to sustain the sheets.

729,113. PROCESS OF UNITING METALS.—John M. Anderson, Pittsburg, Pa. An improvement in the art of producing compound metallic articles which consists in uniting two metallic blanks by the gradual interposition by incremental deposit of a third body of metal between them, and then working such compound blank.

729,149. MACHINE FOR MAKING ARTIFICIAL-FUEL BRIQUETTES.—George M. Fenn, Charlotte, Mich. In a machine for compressing material into briquettes, a reciprocating plunger, a plurality of compression-chambers, plates forming the side walls of said chambers, separable backing-blocks disposed between the plates, a longitudinally adjustable wedge between said blocks, and means for adjusting the wedge.

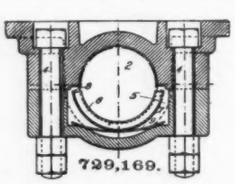
729,105. BLAST FURNACE HEARTH.—Maximilian M. Suppes, Elyria, Ohio. In a blast-furnace hearth, a metallic hearth-jacket plate or section having a tap-hole therein, and formed with an integral iron trough or spout into which the hot metal is discharged by the said hole.


729,105.

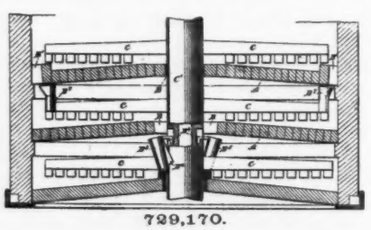
729,150. LOADING OR UNLOADING APPARATUS.—Andrew G. Flesher, Taylorville, Ill. In a system for loading coal and the like, the combination of a shaft, hoisting-cages adapted to operate in the shaft and having gate-controlled outlets, said cages having horizontal supply-doors forming the entrance to the coal-compartment, and also serving as the floor of an upper compartment, supply-chutes having gas-controlled outlets, and a plurality of radial mine-entrances connecting with the chutes; means for releasing the gates to enable the chute to deliver their contents into the cages; and means for releasing the gates of the cages to permit the discharge of the loaded product.

729,166. X-RAY TUBE.—John O. Heinze, Jr., Chelsea, Mass. In an X-ray tube, an anode; a cathode; and a metal, funnel-shaped means, insulated from, and located between, said anode and said cathode, to concentrate the cathode-stream so as to form a small fixed area of bombardment on said anode.

729,169. BATTERY STAMP-STEM GUIDE.—John H. Hendy, San Francisco, Cal. The combination in a stamp-stem guide of a box, a chambered cap and a filling of spring-supported felt or equivalent yielding flexible material.


729,169.

729,170. ORE-ROASTING FURNACE.—John B. F. Herreschoff, New York, N. Y. A roasting-furnace having shelves apertured for the passage of the ore, and means for crowding the ore toward the apertures of the shelves, in combination with spouts extending between the shelves and adapted to direct the ore on its way from one shelf to the next shelf below in such a manner as to protect the ore from the influence of the draft.


729,170.

729,202 and 729,203. COMPOSITION OF MATTER.—Hans Molchin, St. Louis, Mo. A composition comprising a mixture of plaster-of-paris, coal-cinders, mica and slaked lime.

729,204. PROCESS OF FORMING COMPOSITIONS OF MATTER.—Hans Molchin, St. Louis, Mo. A process of forming fire-proof blocks or bricks consisting of mixing dissolved lime with water in a receptacle; second, mixing comminuted mica with plaster-of-paris and placing enough of same in the water to form a clinging mass; third, adding a porous material like sifted coal-cinders; fourth, mixing said ingredients; fifth, adding thereto silicate of soda in the proportion of .002 per cent. to the whole; sixth, pouring the entire composition into molds; and seventh, exposing same to the atmosphere to set.

729,259. APPARATUS FOR CHARGING RETORTS.—Léon Bertrand, Paris, France. The combination of a motor; a charging device operated by said motor; a feed device adjacent to said charging device; and means, thrown into operation by said feed device, for reducing the speed of said motor.

729,281. PROCESS OF MAKING STEEL CASTINGS.—William E. Coyan, Homestead, Pa. A process of forming steel castings to increase their tenacity and reduce their porosity, which consists in mounting a pipe in a mold, then running a cooling medium through said pipe, then pouring molten metal into said mold and permitting the running of the cooling medium until the casting is cold enough to stand alone, then withdrawing said pipe, then playing a stream of said cooling medium into the resulting aperture in the casting to cool the interior of the casting, and then discontinuing said stream to permit the heat in the outer portion of the casting to reheat the cooled inner portion.

729,292. HOISTING AND CONVEYING APPARATUS.—Joseph H. Dickinson, Atlanta, Ga., assignor to the Lidgerwood Manufacturing Company, New York, N. Y. The combination with a trackway, a carriage theron, and means for moving the carriage along the trackway, of a hoisting-rope, two wheels upon the carriage receiving the hoisting-rope and connected to have differential peripheral speeds, means for taking up and paying out the two ends of hoisting-rope independently of each other and at variable speeds, and a fall-block suspended in a loop of the hoisting-rope between said differential wheels.

729,321. PROCESS OF PREPARING FUEL COMPOSITION.—Oskar Francke, Mühlhausen, Germany, assignor to Martin Heberlein, Eisenach, Germany. A method consisting in mixing intimately a reduced combustible with calcium sulphate, then applying dilute nitric acid and dilute glycerine so as to inclose or coat the combustible with nitro-glycerine-lige substance and water, and finally forming the fuel into desired shapes and drying the same.

729,370. CONTINUOUS HEATING-FURNACE.—Henrik V. Loss, Philadelphia, Pa. In a continuous heating-furnace having receiving and discharge openings at or near the ends of the furnace, and supports extended from such receiving-opening to the discharge-opening, a movable bearing for the articles being treated, such bearing resting directly on and spanning the space between the supports and formed in separate sections capable of being separately discharged or removed from the furnace.

729,426. COAL-DIGGER.—Zaccheus Scott, Blythesdale, Pa. In an auger, the combination with the stem, of the body-brace, a sleeve formed intergral with the said brace, said sleeve having its outer end internally screw-threaded, an externally-screw-threaded bearing in threaded engagement with the threaded interior of the said sleeve, said bearing having screw-threaded bore, an externally-screw-threaded adjusting-block arranged in the bore of the said bearing, and a ball arranged in the inner end of the said sleeve, and engaging the said block and stem.

729,428. WELDING COMPOUND.—Matthew P. Shafer, Vandergrift, Pa. A welding compound consisting of the following ingredients by weight, and substantially in the proportions specified; iron or steel chips, shavings or filings, 16 parts; sal-ammoniac, 4 parts; burnt borax, 4 parts.

729,492. APPARATUS FOR MANUFACTURING WHITE PIGMENT.—James B. Hannay, Loch Long, Scotland. In apparatus for the production of white pigment in which the condensed pigment is collected on cloth bags suspended in a chamber, the combination of plates forming the tops of the bags, links connecting adjacent plates together to form a row, and a rod connected to one of the plates and provided with a handle outside the chamber, whereby when the handle is moved vertically a rocking motion of the plates forming the tops of the bags is produced.

729,493. APPARATUS FOR MANUFACTURING WHITE PIGMENT.—James B. Hannay, Loch Long, Scotland. A furnace for the production of white sulphate-of-lead pigment consisting of a hearth, coke slabs piled on the same, a furnace-body with a basic lining, air-inlets for both forced and induced draft, together with means for feeding granular galena into the furnace.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending May 9, 1903.

8,302 of 1902. PRODUCING SULPHATES OF LIME AND ALUMINUM.—N. Alvisi and F. Millosevich, Rome, Italy. Producing sulphates of potash and aluminum by heating alum with lime to produce sulphate of lime, sulphate of potash and aluminate of lime, then acting on the latter with the sulphuric acid so forming sulphate of aluminum and sulphate of lime.

8,345 of 1902. MINER'S LAMP.—F. J. Turquand and J. F. Wakelin, London. Improved form of miner's lamp lit by means of secondary battery.

9,076 of 1902. MINE SPRINKLER.—M. T. Lewis, Pontypridd. A water sprinkler for mines, consisting of a tank-wagon, the spray operated from the axle.

25,353 of 1902. CATHODE.—C. Arzano, Brussels, Belgium. Improved mercury cathode for use in the electrolysis of salt.

27,569 of 1902. BALL-MILL.—J. Kraus, Cologne, Germany. In ball-mills for wet grinding, arrangements to ensure the regular influx of water and efflux of pulverized material.

1,836 of 1903. ZINC-BARIUM PIGMENT.—W. J. Armbruster and J. Morton, St. Louis, U. S. A. Pigments composed of mixtures of zinc sulphide and barium sulphate and carbonate.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. J. W. Mercer is at Detroit, Mich.

Mr. A. A. Blow has gone to his home in Virginia.

Mr. F. H. Minard, of Denver, was in New York last week.

Mr. Ben. B. Lawrence has returned to New York City.

Mr. W. Pellew-Harvey, of London, has returned from Russia.

Mr. Alfred H. Main has gone to the Black Hills, S. Dak., and to Colorado.

Mr. J. Trowbridge Bailey, of New York, has gone to Colorado on professional work.

Mr. H. H. Knox has returned from a professional trip to the Black Hills, S. Dak.

Mr. H. Boholm, mining engineer, of Trondhjem, Norway, is in New York City.

Mr. Leo Von Rosenberg, of New York, has been in Georgia examining several mines.

Mr. Alexander Hill has gone to Bengal, India, to examine the Rajdoha Mining Estates.

Mr. J. T. Marriner, late manager of the Great Boulder Main Reef, at Kalgoorlie, is now in London.

Mr. Charles E. Hart, general manager of the John Jackson Mine, Joplin, Mo., is visiting New York City.

Mr. Percy Williams has been appointed manager of the Imperial Copper Company, in Pinal County, Ariz.

Mr. George A. Wright has gone to erect a new plant for the Darien Gold Mining Company, at Cana, in Colombia.

Mr. H. A. Wheeler, of St. Louis, Mo., has been examining properties in the Joplin zinc district for Eastern men.

Mr. Nicholas J. Martin is constructing engineer at the new plant of the Encampment Smelting Company, in Wyoming.

Mr. C. Baring Horwood recently left London by the *Saxon* for Johannesburg, where he will go into professional practice.

Mr. A. G. Charleton is at Sydney, N.S.W., en route to inspect certain copper mines in the northern part of New Caledonia.

Mr. Edward H. Mason, formerly at Denver, and now engaged in opening up coal measures in Mexico, is visiting New York City.

Mr. A. S. Bacon has returned to Lovelock, Nev., after wintering in California, and will resume work at the Borax Mine near Boyer.

Mr. F. Longmaid, of Oakland, Cal., is now superintendent of the Velardena Mine and Smelting Company, at Velardena, Durango, Mex.

Mr. G. V. Mitchell, of Denver, recently spent a week in Leadville, Colo., returning to Teviston, Ariz., where he has charge of the Buckeye Mine.

Mr. R. A. F. Penrose has left Philadelphia for Chicago, en route to Alaska, where he intends making a lengthy investigation of the important mining districts.

Mr. Charles Day, of the firm of Dodge & Day, of Philadelphia, read a paper on "Machine Shop Methods" before the S. K. C. Club at Pittsfield, Mass., on May 27.

Mr. R. C. Shaw, general manager of the Thayer Mining Company at Meramar, Costa Rica, left Port Limon on June 1 for New York on business connected with this company.

Mr. Frank Gardner, chairman of the Great Boulder, Perseverance and other mines in West Australia, was run over recently in the Champs Elysees, Paris, but not seriously injured.

Prof. Israel C. Russell, of the department of geology in the University of Michigan, will visit central Oregon this summer to study the geology and especially the artesian conditions of the district.

Mr. Herbert Haas, formerly connected with the Torreon Metallurgical Company, of Torreon, Mex., as foreman of the smelting department, has been in San Francisco, Cal., on professional business.

Mr. George J. Rockwell, formerly metallurgist for the Allis-Chalmers Company, now holds a similar position at the Butte, Mont., copper properties of Judge James B. Reed and Mr. Ralph Baggaley.

Mr. G. F. Rendall, consulting engineer for the American Lead Corporation, New York City, has prepared plans and specifications for a 200-ton smelter for treating low-grade ores at Gunnison, Colo.

Mr. R. A. Hadfield, managing director of Hadfield's Steel Foundry Company, Limited, Sheffield, Eng., who is now in the West for the purpose of purchasing machinery, etc., is expected to return to New York soon.

Mr. John Hays Hammond was quite ill recently by reason of ptomaine poisoning, incurred during his Mexican trip, but he has, we are glad to say, recovered sufficiently to travel. He left Colorado Springs for New York on June 3.

Mr. John D. Irving, who has for several years been in charge of field parties in the Division of Economic Geology, United States Geological Survey, has been made assistant professor of geology at Lehigh University, Bethlehem, Pa.

Dr. George C. Martin, assistant in paleontology at Johns Hopkins University, is in charge of an expedition, sent out by the United States Geological Survey to study the coal and oil resources of the Cook's Inlet region in Alaska.

Mr. S. A. Parnall, of El Paso, Texas, recently manager of the A. C. Burrage mining interests in the Terrazas District, Chihuahua, Mex., has been appointed superintendent of the Higgins Development Company in the Globe District, Ariz.

Mr. Robert E. Mackey has resigned as assistant general sales agent of the coal department of the Delaware & Hudson Company. Mr. Mackey was in the employ 30 years, and was assistant sales agent at the New York office for 19 years.

Mr. Arthur S. Dwight, formerly assistant to the president and general manager of the Campania Metalurgica Mexicana, has resigned to accept the position of consulting engineer and assistant to the president of the Greene Consolidated Copper Company.

Owing to a confusion in names, it has been reported that Mr. George J. Bancroft, of Denver, was dead. It is with no little pleasure that we can state that the mining engineer in question is very much alive, active and well. Mr. Bancroft has just returned to Denver from a professional trip to Arizona and California.

Mr. B. Koto, professor of geology of the imperial University of Tokio, Japan, arrived recently at San Francisco by way of Victoria. Prof. Koto is the Japanese representative to the coming geological congress in Vienna. He intends making a tour of this country, inspecting certain institutions of learning before proceeding to the congress.

Mr. Charles E. Dinkey, formerly assistant superintendent of the Edgar Thomson Steel Works and blast furnaces, Bessemer, Pa., has been promoted to general superintendent, vice Mr. Thomas Morrison resigned. Mr. John Lewis, formerly master mechanic, becomes assistant superintendent, while Mr. Daniel Seigh becomes master mechanic.

Mr. John T. Morrow, now superintendent of the Boston & Montana Consolidated Copper and Silver Mining Company, at Great Falls, Mont., has resigned to accept the position of general manager of the Greene Consolidated Copper Company and the Cananea Consolidated Copper Company, at the mines at La Cananea, Sonora, Mex. Mr. Morrow expects to assume his duties at Cananea on July 1.

Mr. William H. Joyce, who recently resigned as freight traffic manager of the Pennsylvania Railroad, was born in Baltimore, Md., in 1854, and became coal freight agent of the Pennsylvania in 1885. He became general freight agent in 1888 and freight traffic manager in 1897. His position made him a conspicuous figure in the Atlantic seaboard bituminous trade. He retired because of failing health. Mr. George P. Dixon succeeds him.

Mr. C. D. Grove, superintendent of the Telluride bromination mill at Colorado City, Colo., has received a patent for a process of recovering bromine after it has been used in the extraction of gold. The Telluride plant is the only one in the United States using the bromide process. Expert Cassell, of London, Eng., and others are associated with Superintendent Grove in the patent. The process is being used at the Telluride mill, and is considered of importance in saving of bromide.

Mr. Thomas Morrison, general superintendent of the Edgar Thomson steel works and blast furnaces of the Carnegie Steel Company, at Bessemer, Pa., has resigned and will retire from business. He is a nephew of Andrew Carnegie, and was born and educated in Scotland. In 1886 he came to America, later secured a position with the Homestead Steel Works, and soon worked his way up to superintendent. In 1891 he was appointed superintendent of the Duquesne Steel Works, and in 1895 was transferred to the same position at Braddock. He is a director of the Carnegie Steel Company, and one of the largest stockholders.

OBITUARY.

Henry Lee Arringdale, a mining engineer of high character, died at the age of 40, on April 29, at Woodland, in Talbot County, Maryland. Mr. Arringdale was recently connected with active operations in the Virgilina copper belt. Three years ago he began prospecting for copper in Person County, N. C., and had made good progress when a fire last August destroyed the plant and machinery. Mr. Arringdale enjoyed a reputation for being a capable and honorable man throughout his career.

Prof. J. Peter Lesley, the well-known geologist of the University of Pennsylvania, died at his home in Milton, Mass., late on Monday evening, aged 83. He was professor of geology and mining, and dean of the scientific faculty of the University of Pennsylvania from 1872 to 1878, and since 1886 had been professor emeritus at that institution. As State geologist he was in charge of the complete resurvey of Pennsylvania, which began in 1874, and lasted until 1895. The various reports of this survey cover the stratigraphic and economic geology of the State, thoroughly. President Lesley recognized that the State's mineral resources could best be developed through the aid of trained observation, yet he did not neglect matters of scientific interest, as is shown notably by the work Lesquereux was enabled to do on the carboniferous flora. The work in New York by Prof. Hall and the second survey of Pennsylvania will be classics in the annals of American geology, the work done in Pennsylvania being chiefly of economic interest, while that in New York determined the early palaeozonic horizons in North America.

Prof. Lesley, besides his work in Pennsylvania, made extensive researches in the coal, oil and iron fields of the United States and Canada. He was born in Philadelphia, September 17, 1819, and graduated from the University of Pennsylvania in 1838. He studied at Princeton Theological Seminary, and in 1844 was licensed to preach by the Presbytery of Philadelphia. After several years more of study he became pastor of the Congregational Church at Milton, serving from 1848 to 1851. Then his views on theological matters changed and he left the ministry. He leaves a widow and two daughters.

SOCIETIES AND TECHNICAL SCHOOLS.

UNIVERSITY OF NEVADA.—John A. Reed, instructor in mining at the University of California, is to have charge of the department of mining; Vance Osmont, instructor in geology at the University of California, will have charge of the course in dynamic geology, and Bernard Echevenia, of the University of California, will be at the head of the department of civil engineering.

NEW MEXICO SCHOOL OF MINES.—During the coming year an extended course of lectures on mining law will be given by the Daniel H. McMillan, judge of the United States District Court. Gay M. Hamilton, of the University of Nebraska, has been elected instructor in geology. Leon Dominion, graduate student in the Mining School of the University of Liege, Belgium, has been appointed an instructor.

CORNELL UNIVERSITY.—The register for the current year gives the total number of regular students enrolled as 2,968, of whom 783 were in the academic department, 245 in the college of civil engineering, and 886 in the college of mechanical engineering. More than half of the students were from New York State, though 15 foreign countries were represented. The total number of teachers and lecturers was 421. The college of civil engineering offers courses in drawing, surveying, applied mechanics and hydraulics, hydraulic engineering, municipal and sanitary engineering, railroad and bridge engineering and mining. The college of mechanical engineering offers courses in electrical, marine engineering, naval architecture and railway mechanical engineering. The register gives all necessary information about requirements of admission, expenses of students, etc.

PURDUE UNIVERSITY.—This university at Lafayette, Ind., by its catalogue for the current year, shows a total enrollment of 1,336 students, including those taking special courses. The University has undergraduate courses of study in mechanical engineering, civil engineering, electrical engineering and applied science. The course of study is four years. The school of mechanical engineering offers instruction in shop practice, machine design, transmission of power, hydraulic engineering and steam engineering. The work of the school of civil engineering comprises shop practice, railway engineering, bridge, hydraulic and sanitary engineering. The school of electrical engineering of-

fers courses in shop practice, machine design, electrical engineering, dynamo construction, management of electric lighting and power plants, and telephone engineering. The school of science offers instruction in biology, chemistry, physics, industrial arts, and sanitary science. The University has well-equipped shops and laboratories. Tuition is free to residents of Indiana.

INDUSTRIAL NOTES.

The Ingoldsby Automatic Car Company, St. Louis, Mo., intends establishing a branch shop in Denver, Colo.

The Sugartown Platinum Company, of Malvern, Pa., has begun the erection of a new brick plant. Joseph B. Mattack is president.

The Taylor & Brunton Ore Sampling Company, of Colorado, is building a new ore sampler at Butte, Mont., with A. R. Sutherland, the company's engineer, in charge of construction.

The Forest City Steel and Iron Company, Cleveland, recently contracted with the Toledo Portland Cement Company, Toledo, O., for the structural steel for its new plant at Manchester, Mich.

The Nova Scotia Steel and Coal Company has decided to remove a portion of its works from New Glasgow to North Sydney, and expects to have at least one plant completel by the end of the year.

Messrs. Humbird, Leedom & Co. have placed an order for a wire rope tramway with the Trenton Iron Company, through their agents, Van Voorhis & Sanford, for the San Juan Mine, near Monterey, Mex.

The New York office of the Plunger Elevator Company, 156 Fifth Avenue, has closed a contract for two of the latest types of plunger elevators to be installed in the New York Maritime Exchange.

The A. S. Cameron Steam Pump Works, 443 East Twenty-third Street, New York City, has obtained a substantial contract for pumps for the Trans-Caspian Railroad, now under construction by the Russian Government.

The Fairbanks Construction Company, of Marion, O., is erecting a new plant, which it is expected will be ready by November 1. The company manufactures a newly designed steam shovel and other goods of similar nature.

The National Tube Company has begun work at McKeesport on the large mills in the $10,000,000 group of plants. The first plant will be the bessemer converting and blooming departments, of a daily capacity of 300 tons of steel.

The new furnace of the Low Moor Iron Company, of Low Moor, Va., is to be blown in about July 1. The company has two furnaces in operation at Low Moor and one at Covington, both in Allegheny County, of a total capacity of 90,000 tons. The new furnace is 90 by 19 ft.

A plant is to be built in Monterey, Mex., for manufacturing Huennekes bricks. The plant will be constructed by the Pan-American Pressed Brick Company, of San Antonio, Texas, a concern organized to manufacture these bricks in Mexico and certain portions of the Southern States.

Bids have been received at the office of Frank Klepetko, New York City, for smelting plant equipment. The machinery, it is said, is for a Michigan copper property, and is to be purchased by a new company now being organized. Mr. Klepetko has been retained as consulting engineer.

The annual stockholders' meeting of the Virginia Iron, Coal and Coke Company was held recently at Bristol, Tenn., when the following directors were elected: Grant B. Schley, Edward J. Berwind, Walter Ferguson, George A. Croker, Charles B. Squier, Henry K. McHarg and John B. Newton.

The Damascus Steel Company, of Des Moines, Ia., recently organized for the manufacture of Damascus steel by the Dawson process, is now established in its new plant at New Brighton, Pa. The product is steel castings, die steel and tool steels. C. C. Taft is president, J. B. Burton treasurer, and A. M. Haggard secretary.

The Lehigh Valley Railroad is preparing to erect at Sayre, Pa., four large buildings, at a cost of about $3,000,000, viz., a machine and boiler shop, 794 by 366 ft., a storehouse 360 by 103 ft., a blacksmith shop of the same dimensions, and a power house, 300 by 100 ft. The shops are to be equipped with the most improved machinery and electric power.

It is stated that the Jenckes Machine Company, of Sherbrooke, Que., which has a $400,000 contract for castings and machine work for the Ontario Power Company, of Niagara Falls, Ont., will establish an extensive plant at Chippewa, and will eventually move its entire business to that point, owing to the superior transportation facilities of the Niagara frontier.

The Cambria Steel Company is rebuilding its No. 6 blast furnace at Johnstown, Pa., replacing the old 275-ton stack with one 22 by 85 ft., with a capacity of 400 tons of pig iron per day. McNeil Brothers, of Pittsburg, have the contract for the plate work. The furnace will be blown in about August 15. Webster, Camp & Lane, of Akron, O., are building two large ore bins at Nos. 1 and 4 furnaces.

In addition to the equipment previously purchased from the Westinghouse Electric and Manufacturing Company, the Bishop & Babcock Company, of Cleveland, O., has recently installed a 175-kw., 2-phase, engine-type generator, direct connected to a Ball engine, together with an exciter and four 40-h.p. and one 20-h.p. type C induction motors. George S. Rider & Co., of Cleveland, were the consulting engineers.

The Chicago Pneumatic Tool Company, New York offices, White Building, Liberty Street, has secured contracts for pneumatic tool equipments for installation in the Manchester plant of the British Westinghouse Electric and Manufacturing Company, Limited. A large compound steam-driven air compressor has been ordered for the Barrow shipbuilding yards of Vicker, Sons & Maxim, Limited, for operating pneumatic tools of various description.

The Canadian Copper Company, controlled by the International Nickel Company, is purchasing considerable American equipment for installation in its new plant at Copper Cliff, Ont. The Aultman & Taylor Machinery Company, of Mansfield, O., has taken the boiler contract. There will be four Cahall boilers of 400 h.p. each. The engines are to be of Corliss type, and will be made by the Nordberg Manufacturing Company, of Milwaukee, Wis.

The Sullivan Machinery Company states that on June 1 it was to open a new branch office in St. Louis, Mo., rooms 1209-1210 Missouri Trust Building. This step was necessary owing to the rapid increase of its business in the mining territory, of which St. Louis is the business center. Mr. P. F. Jarvis, who has made St. Louis his headquarters for the past two years, will be the manager of the new office, and will give his personal attention to orders for mining and quarrying machinery.

The steam turbine plant of the Hartford, Conn., Electric Light Company, Conn., which at present consists of a 2,000 h.p. set, is soon to be duplicated by machines built by the contractors for the original installation, the Westinghouse Machine Company. This was the first American plant where steam turbine units of large size were installed. The aggregate power of steam turbine sets completed, in hand and in order to the Westinghouse Machine Company, does not fall far short of 200,000 kw.

The Wood Iron and Steel Company, with $3,500,000 capital, is a consolidation of the Alan Wood Company and the Alan Wood Iron and Steel Company, of Ivy, Pa. The company has under construction five 50-ton furnaces, and it is expected that the plant will be in operation by July 1. The business was established in 1826, and was first incorporated in 1886. The directors are Jonathan R. Jones, Howard Wood, Richard G. Wood, Alan W. Wood, of New York City, and William W. Lukens, of Philadelphia.

The C. O. Bartlett & Snow Company reports a great demand for dryers, hoisting and conveying machinery. The firm is building a large conveyor outfit for the National Carbon Company, of Cleveland, O., and a dryer and conveying outfit for the Detroit Portland Cement Company, Detroit. The Coal Dust Firing Syndicate, of Haydick, England, manufacturer of the Schwartzkopf system of coal dust firing, which investigated the merits of a number of American dryers, has placed an order with the Bartlett & Snow Company for several outfits.

The Empire Coke Company was organized at Geneva, N. Y., recently, with a capital of $1,000,000. The plant is to be built in East Geneva, where 100 acres of land have been purchased for building, byproduct ovens and sidings. The company will take over the gas companies of Geneva, Waterloo, Seneca Falls and Auburn, and a pipe line will be laid from the plant for a supply of gas to those places. It will be in active operation by December 1. The officers are: E. H. Palmer, president; General C. J. Langdon, vice-president; W. L. Herendeen, secretary.

The National Peat Company, of Chelsea, Mich., has had plans for a group of buildings for a manufacturing and storage plant prepared. The buildings will be a drying house, 40 by 80 ft., by 40 ft. high; a pressing and engine house, 60 by 80 ft., 18 ft. high; a boiler house to contain two boilers, a loading shed, 40 by 60 ft., and a shed 200 ft. long for drying the peat. The buildings will be of brick, with composition roofs. The equipment will include a 100-kw. dynamo, a 200-h.p. engine and six pressers. The plant will have a capacity of 100 tons daily, and is to be in readiness for business by September 1.

TRADE CATALOGUES.

Bulletin No. 1042, issued by the Fort Wayne Electric Works, of Fort Wayne, Ind., is about arc-circuit cut-outs. Bulletin No. 1043 treats of single-phase generators, type W A L. Bulletin No. 1044 describes belt-driven direct-current generators for lighting and power.

An 8-page circular sent out by the St. Louis Well Machine and Tool Company, of St. Louis, Mo., describes the St. Louis center-beam driller, to be operated by a detached steam or gasoline engine, by means of a long belt. The three important points of merit claimed for this machine are strength, ease of operation and durability. It is made in five sizes, with a capacity of from 500 to 1,500 ft., the horse-power required ranging from 8 to 16.

The A. Wyckoff & Son Company, of Elmira, N. Y., sends out circulars and pamphlets describing the metal-bound wood pipe that it manufactures. The company states that such pipe is desirable not only for carrying acidulated water, which would soon corrode iron pipe, but for carrying fresh water for drinking purposes since the natural flavor of the water is preserved. The company is now putting on the market a special wood pipe for mine use under pressures as high as 160 lbs. per sq. in.

The American Spiral Pipe Works, of Chicago, Ill., manufacturing Taylor's spiral rivetted steel pipe, has just issued a new catalogue. The company calls attention to the fact that it is furnishing this pipe in larger sizes and heavier gauges than has ever been produced. The sizes are from 3 to 40 ins. in diameter. The company also state that it believes its catalogue to be the most complete that has ever been published on this pipe. The pamphlet contains about 12 pages of valuable tables, and information which hydraulic engineers and others will find convenient. The pipe is especially adapted for water lines, exhaust steam, etc.

The Marine Iron Works, Station A, Chicago, Ill., has issued a new illustrated catalogue that it will send free on request. The company makes a specialty of designing and building modern steam marine machinery for vessels ranging from 30 to 160 ft. in length, covering paddlewheel and screw propeller machinery, condensing or non-condensing, for either salt or fresh water, as may be required. The large line of marine boilers which it builds includes the Roberts safety water tube, as also the better class of shell marine boilers, for either hard coal, soft coal or wood fuel as desired. The new catalogue illustrates and mentions 35 different sizes and types of screw propeller engines and 36 different paddlewheel engines, all of modern type. Fifty different sizes and types of marine boilers are listed.

The assay circular sent out by Eimer & Amend, of New York City, is a pamphlet of 28 pages, describing the firm's balances, crucibles, laboratory, ore crushers and pulverizers, slime tables, classifiers, muffle and crucible furnaces, muffies, scorifiers, crucible tongs, lamps, etc. Particular attention is called to the company's new short beam assay balance sensitive to 1-400 mg., and listed at $125. Another balance for analytical work, with non-corosive weights and sensitive to 1-10 mg., with a load of 100 g., is listed at $60., the manufacturers claiming that this balance combines features not to be had in any other for the same price. Including in the pamphlet are specifications, with prices, of complete assay outfits for prospectors or for mine use. Eimer & Amend manufacture, import and deal in acids, chemicals, platinum ware, and, in fact, all assayers' and chemists' supplies.

Catalogue A, issued by the American Air-Compressor Works, of New York City, is a pamphlet of 54 pages of the standard of 6 by 9 size, and is sent to any address upon application to the company. The catalogue illustrates and describes the many types of air compressors, carbonic acid gas and high-pressure compressors, air receivers and vacuum pumps made by the company, as well as the American air-lift pumping system. The company states that it has its own foundry for brass and iron work, its own pattern and blacksmith shops, and its machine shops are equipped with the latest tools. It claims to produce simple, durable, efficient and economic machines designed for maximum strength with minimum weight. Besides its regular compressors the company builds three or 4-stage compound compressors, according to individual requirements, suitable for pressure up to 2,500 lbs. per sq. in.

A handsome pamphlet of 84 pages, with an artistic cover design, is sent out by the Austin Manufacturing Company, of Chicago, Ill. The company manufactures Austin gyratory crushers and elevators, screens, hoists, etc., and designs complete rock crushing plants. The company says of its crusher that, having had wide experience in building and practical acquaintance with the development of gyratory crushers, besides having ample facilities for the production of large machinery in a mechanical and scientific manner, its Austin crusher combines many improvements, and has great capacity and durability. It is easy of adjustment, and has an improved oiling system. Other merits of the crusher are described in detail, and the company states that it guarantees every piece of machinery it puts out. The crusher is made in 9 sizes.

with a capacity of from 2 to 150 tons of macadam crushed to a 2.5-in. ring per hour. Included in the pamphlet are a large number of testimonial letters, including some from prominent mining concerns. The pamphlet also gives plans of a number of crushing plants erected by the company. The Austin Company makes dump cars of all sizes and styles.

SPECIAL CORRESPONDENCE

Butte, Mont. June 1.

(From Our Special Correspondent.)

Serious trouble is liable to occur in the underground workings of the Pennsylvania Mine, between the forces of the Montana Ore Purchasing Company and the Boston & Montana Company. Both outfits are at work on what is known as No. 7 vein of the Pennsylvania ground. Some months ago the Montana Ore Purchasing Company's forces captured certain workings on No. 7 (and are still in possession), driving off the miners then at work for the Boston & Montana Company. The latter company is also mining on another portion of the same vein, each party working toward the other; when they meet somebody will probably get hurt. So far the Supreme Court of the State has not seen fit to stop either party, although each side has asked for an injunction against the other. Several clashes have already taken place between the miners on the opposing sides.

The Butte, Anaconda & Pacific Railroad, for its length, will probably compare favorably in dividend earning ability with any other railroad line in the country. The track between Butte and Anaconda is about 28 miles. Ninety-five per cent of the road's traffic is from business of the Amalgamated Copper Company, principally ore from the Butte mines to the Washoe Smelter at Anaconda. The road makes a haulage charge of 20c. a ton between the two points, or five-sevenths of a cent a ton-mile. The last statement of the railroad company shows net earnings on the capital stock of 20 per cent for the fiscal year.

The Amalgamated Copper Company has changed its policy in regard to leasing. Some months ago the management at Butte advised the leasing of such mines as the company was not operating, and the company has now decided to do this. The past month a number of leases have been given on some of the smaller veins. This should considerably increase the daily output of the camp.

Denver. May 30.

(From Our Special Correspondent.)

Mr. W. Weston has been appointed manager of the land, industrial and mining department of the Denver, Northwestern & Pacific Railway, the new Moffat road. He is also manager and vice-president of the Frontier Investment Company, a subsidiary concern of the Colorado-Utah Construction Company, which is building this new line from Denver to Salt Lake City.

During the month of May more than 10,000 tons of siliceous Chilean silver ores will have been received at the Denver and Pueblo smelters of the American Smelting and Refining Comapny. The ores are shipped from Autofogasta, Chile, to Galveston, Tex., thence by rail to Denver and Pueblo, where they are used with ores from the Coeur d'Alene.

Preparations are being made by the Colorado State Auditor to sue the American Smelting and Refining Company for its flat tax. The company is incorporated at $100,000,000, and the tax due the State at this time is $18,805. The company has not paid any flat tax since the law was passed requiring corporations to do so, the validity of the law being questioned. A recent ruling in the District Court to the effect that the United States Reduction and Refining Company must pay its taxes before it can have any standing in court, is to be used. The State officials are planning to sue all the corporations who are delinquent, and in this way force them to pay. When made defendants in a suit, they must pay their arrears or they will have no standing in the courts, and the case will go by default. Thus the State Auditor expects to collect at least $100,000 now due the State.

During the past week the annual conventions of the American Labor Union and the Western Federation of Miners, one of its auxiliaries, have been held in this city. In the latter there were 110 delegates. In addition to Socialism, which the Federation of Miners is pushing as an ultimate solution of all so-called labor problems, the convention dealt with the establishment of co-operative mining, with the Standard Mill strike at Colorado City, with the purchase or erection of a large office building in Denver, and with a general 8-hour law. President Moyer, in his official address, declared for a universal 8-hour day, and recommended that the convention select a date in the near future when no member should work more than 8 hours. He arraigned the late Colorado legislature for its failure to pass an 8-hour law. He also recommended a co-operative mine. Among other things he said: "No permanent relief to the wage workers can be brought about through trades unionism," and "as labor produces all wealth, such wealth belongs to the producer thereof."

San Francisco. May 27.

(From Our Special Correspondent.)

Under authority of the Legislature the State Mineralogist, Lewis E. Aubury, is arranging to make a mining exhibit at the St. Louis Exposition, requiring some 6,000 ft. of floor space. Mr. Aubury expects to obtain about $25,000 for the mineral display, and the State Mining Bureau already has a good collection that is available.

The special bulletin on the quicksilver deposits of the State being prepared by the Mining Bureau is almost completed. W. P. Hammon, of Oroville, is preparing for the Bureau a bulletin on gold dredging in California. A mineral map and register of mines of Tuolumne County is being prepared by Field Assistant R. P. McLaughlin.

The Meadow Lake District in Nevada County, about 8 miles from Cisco, Placer County, is again receiving some attention. Many years ago there was a large town there with many brick buildings, quartz mills, etc. Finally the whole place was entirely deserted, as the ore was too "rebellious." Now some new mills have been built and certain men are trying to solve the question of making Meadow Lake ores pay. The district is at a high altitude, and work is difficult in the winter. However, a mill has been busy the past winter, and the yield is satisfactory to the others. The good ore occurs in small bunches or kidneys in the veins, while the rest of the vein is worth little. In fact, the principal reason men have been unable to get pay from the average run of the ore, is because the gold is not there, but so simple a reason is not generally recognized.

Some San Jose real estate men, who have recently visited the Eastern States and found numerous people looking for "going" mines, have been making a trip up into the Grass Valley District in hopes of getting mines to sell to their clients, but found very few mines seeking purchasers. It is much easier to talk of buying going mines than to find them for sale at low prices.

The burning this week of the big dredge of the Ashburton Mining Company, working on the American River, near Folsom, due to the bursting of a tank of gasoline, caused a loss of over $100,000. It was next to the largest dredger in the world, and was owned by a Boston, Mass., company. Its operation has been profitable.

The Central Eureka Mining Company, at Sutter Creek, milled last year 43,545 tons of ore, which yielded in free gold and sulphurets $261,903. The cost of mining was $1.79½ per ton; cost of development, $0.519, and cost of milling, $0.490, or a total of $2.804 per ton. The actual value of the ore worked in free gold, sulphurets and tailings was $6.499 per ton, and the net value after deducting cost of refining bullion and reduction of concentrates $5.74. The mine has produced bullion to date amounting to $661,527, and paid dividends of $177,299. The dividends for last year were $87,657.

The strike in the deep levels of the Yellow Aster Mine at Randsburg has caused a sort of revival in the camps in that direction, and many abandoned claims have been relocated. For a year or more many supposed the Yellow Aster had seen its best days, and some of the neighboring camps, like Garlock, could not even support a saloon, a pretty sure evidence of decline. At Randsburg and Johannesburg, however, many claims are worked, many of them successfully.

San Luis Potosi, Mex. May 26.

(From Our Special Correspondent.)

It is understood that the negotiations for the Dolores Mine in Chihuahua under option to the Guggenheim Exploration Company, will be resumed. The price was $1,750,000 gold. The mine was examined by several of the engineers, who act as assistants to Mr. Hammond and was passed favorably by them, so that it was expected that he himself would confirm the estimates. However, somewhat to the chagrin of certain financial interests, Mr. Hammond concluded that the mine would not warrant a price of over $1,250,000, and on this basis negotiations are to be resumed.

Mexico has generally been looked upon as a country free from strikes, but word has come of what is practically a strike at the plant of the Boleo Copper Company, at Santa Rosalia, Lower California. The company gave notice of a decrease in wages all around, so there was an exodus to the various new gold fields of the peninsula, and to Cananea, Sonora, and vicinity, where better wages were reported paid. The company at once sent its agents to San Francisco to contract for 1,000 Chinese laborers, which it will put at work in the mines and smelter.

Messrs. C. W. Phillips and Robert Lewis are opening up a free-milling gold property in the Rey del Oro Mine, near Cucurpe, Sonora, close to the American border, and are preparing to put in a mill to handle it. Mr. C. Harlot, president and general manager of El Triumfo Mining Company, has gone to the States for machinery to enlarge the Triumfo reduction works; Thomas Bentley, vice-president and general manager, is making extensive additions to the plant of the Cortez Gold and Copper Mining Company. Excellent oil indications are reported near Cocori on the Yaqui River, about 80 miles from its mouth, and that drills have been ordered, derricks will be erected the coming month, and July will see them drilling for oil.

It is said on good authority that an American company, with a capital of $4,000,000, has a concession on government lands about 75 miles wide, along the coast of Tamanlipas, for 200 miles north of Tampico, largely for developing the asphalt and oil fields there, establishing a port at Soto La Marina, and building possibly a railroad to Brownsville, Texas. A new company is preparing to open on a large scale the coal fields of Ciudad de Mier, Tamaulipac, and another will develop the oil fields at Ebano, near the Texas line.

In the State of Sinaloa considerable work is going on, the Tajo mines at Rosalia, by a Los Angeles company, of which John Bradbury is president and general manager. Rich silver, gold and copper veins are reported in a new district, about 45 miles east of Bainva. Into the Territory of Tepic, just south of Sinaloa, a large Iowa company is going as soon as titles can be cleared to the old and rich silver and gold mines of Espiritu Santo at Compostela. Through San Marcos, Jalisco, machinery is being taken for the mines of Santa Maria del Oro, of which W. B. Hunter is manager.

In Durango, at Mapimi, the Campania Minera de Penoles, has just finished what is said to be the largest power plant in Mexico, by which it will transmit power to the Ojuela Mines for all purposes. To this company's smelter, though not strictly a custom plant, La Reina Mine is shipping some 20 tons a day. At Jaboncillo sulphur in paying quantities is reported discovered by Manuel Reiva. At Yerbabuena, a deal, which has been pending for some time, has finally been made by the sale from Charles Fowles to E. H. Stanley, representing Detroit, Mich., men, of the Bunker Hill, America, Sobersalante and Mesa mines. The Mesa is a continuation of the Mina Grande, operated by Wolcott and associates, of Colorado, and the America is a large low-grade property. The new company will continue work with as little delay as possible.

At Matehuala, San Luis Potosi, Mr. James Kilton, of Denver, Colo., and associates, after considerable trouble, have raised money for the construction of a smelting plant, work on which has just begun. This enterprise should be a great boon to the camp, and if the company can make satisfactory arrangements with the Santa Maria de la Paz Mine, of Matehuala, having an output, under the management of Mr. William B. A. Dingwall, of over $100,000 per month, it should have no difficulty, unless the railroads discriminate against it. The new smelter would also receive the product of the Marona Mines, about 25 miles southeast of Matehuala, the property of Mr. Dingwall, where a small lixiviation plant is in operation, and Mr. Dingwall is building a larger one. The Campania Minera de Dolores Trompeta, a new company of Catorce, has just given an order for a complete plant of machinery.

In Nuevo Leon the new company of La Silla, organized to work the properties of Frank Robinson on Saddle Mountain, has started work and will ship to Monterey. The Nuevo Leon Mining Company, operating south of Montemorelos, is drawing up plans for a concentrating and reduction plant.

In Coahuila, the recent copper discoveries, in the neighborhood of Parras de la Fueute, have drawn many prospectors to that camp. The principal vein is said to be about 9 ft. wide, averaging 15 per cent copper. At Monclova the Reforma Mine, at present shipping to Monterey, may erect a concentrating plant, and perhaps later a smelter, for its low-grade copper ores. At Rancho Nuevo and Custro Cieuagas, on a branch of the Mexican International Railroad from Monclova, rich finds are reported of both lead and copper; and because of a percentage of manganese good treatment charges are obtained. The Monterey Smelter itself is entering and denouncing ground in many places. At Bajan, below Monclova, some rich strikes have recently been reported in the Bonanza and Rosalia mines, which are still working in the old Mexican way, though the San Luis Mine nearby has just given a contract for a plant of machinery to cost $100,000 or more.

Exchange on New York during the week went up to 233½, with very little business. Mining stocks were a little more active; La Paz, of Matchuala, went to $725; Dos Estrellas went as high as $2,475; Esperanza y Anexas to $1,400; Cinco Senores to $190; Candelaria de Pinos, $300; Providencia, San Felipe, Guanajuato, $135; Soledad, Pachuca, $370; Sorpresa, Pachuca, $315; Santa Gertrudes, $79½; Luz de Borda, $115; and Amistad y Concordia, $74.

London. May 23.

(From Our Special Correspondent.)

A few weeks ago I reported the flotation of the San Francisco del Oro Mines in the Parral District of Mexico, by the firm of Hawdon & McLachlan, of Lon-

don, and I mentioned that Mr. Hawdon had previously taken hold of quite a number of Mexican properties, that had previously been failures, and placed them on more economical footings. His plan was to acquire properties that had been unsuccessful, owing to expensive management or over-capitalization, and to reduce drastically the nominal capital, and to reorganize the management on more economical lines. His most successful venture in this way was the Mesquital Mine in Zacatecas. This mine struggled against heavy debenture debt for many years. The ore is irregular, and inclined to be clayey, so that there were natural as well as financial difficulties. Mr, Hawdon bought it in 1899, and reorganized it with a nominal capital of £30,000. Since then the mill has worked regularly, and dividends amounting to over 50 per cent have already been paid. Another venture that has been less successful is the Parral Mines, Limited. This company was acquired by Mr. Hawdon in 1901, and reorganized with a capital of £30,000. It was intended to unwater the mine, and to work the lode below water level, but the manager instead commenced on the refractory ore still in the upper levels. The ore is, however, patchy as well as refractory, and considerable difficulty has been met with in the attempts to concentrate. Additional capital to the extent of £10,000 has been .raised by the issue of debenture bonds, but this also has been spent, and the company is at the end of its resources, without the problem of the treatment of ore having been solved. During 1902 two adjacent properties, less developed, were also acquired, and sold to new companies, named the Beckman Mining, Limited, and the Diaz Mines, Limited, each having a nominal capital of £30,000. These companies have still some £23,000 cash on hand, and the proposition now is to amalgamate them with the Parral Company, and thus to make the cash in hand available for the purposes of the Parral Mine. As the shareholders in the three companies are nearly identical, no doubt the proposition will be accepted. It is to be regretted that Mr. Hawdon should have the bad fortune to strike so many refractory propositions, for he has shown much ability in mining administration.

The report of the Namagua Copper Company for 1902 shows that the Boer raid in April of last year and the fall in the price of copper have had an adverse influence on the profits. A dividend at the rate of 5 per cent has been paid as compared with 15 per cent in 1901, 30 per cent in 1900, and 40 per cent in 1899. This result is, however, much better than might have been anticipated, as the same causes in the case of its big neighbor, the Cape Copper Company, resulted in an adverse balance during its financial year, ended August 31 last. The Namagua Company has a paid-up capital of £188,000, and since its formation in 1888 has paid over 180 per cent in dividends. The mine continues to develop well, and there is four years' supply of ore in sight. In addition to this, there is other ore that does not concentrate well, and does not pay to ship. Experiments are being made as to the best method of dealing with it.

A new company of considerable promise has been floated in London this week. This is the Nova Scotia Collieries, Limited, which has been formed to acquire coal lands on the coast of Cape Breton Island adjoining Margaree Harbor. These lands have not hitherto been exploited, and present a favorable opportunity for enterprise. The seams outcrop near the coast, and trial borings show the existence of 50,000,000 tons of coal. The properties have been reported on by a number of eminent authorities on coal mining, of whom perhaps Dr. Edward Gilpin, Jr., is the best known in England. The harbor at Margaree Bay is not deep enough for any ships, other than coasters, and a line of rails is to be laid to connect with Port Hastings, where vessels of deeper draft can be accommodated. Development is to be started for an output of 1,000 tons a day. Contracts are already in hand from the vendor, Mr. Ira Taylor, of New York, and from Mr. Roche, of Halifax, for the supply of 200,000 tons of coal a year. The capital of the company is £200,000, divided into £100,000 in 6 per cent preference shares of £1 each, and £100,000 in ordinary shares of the same denomination. The purchase price is £142,500, to be satisfied as to £92,500 in ordinary shares, and £50,000 in preference shares; while the remainder of the capital is underwritten, so as to produce £47,500 in cash, which will provide ample funds for development and equipment. The financial arrangements and the reports on the extent and nature of the coal appear to me to be satisfactory, and the shares seem to be desirable speculations.

It is therefore a matter of considerable regret that one of the London daily financial papers should publish a "scarce-head" article denouncing in unmeasured terms the whole scheme from top to bottom. This criticism will, no doubt, be largely circulated, and may do damage to the company and to the individuals connected with it in one capacity or another. If any of your readers should happen to have seen it, I should like to inform them that the prospectus of the company was not advertised so extensively in the press as is the custom here. The daily financial paper that indulged in this outburst of spleen did not receive the advertisement. I can imagine no other explanation for the outburst.

Perth, W. A. April 27.

(From Our Special Correspondent.)

Kalgoorlie.—Developments continue most satisfactory. The Great Boulder output for March was a record one, 14,480 oz., almost the whole of which came from ore treated by the sulphide mill. This plan is equal in economy of treatment and capacity to anything on the field. The main shaft is being sunk to 1,800 ft., and is expected to cut the main lode at that level in about two months. Good bodies of ore continue to open up at other points above.

The latest find on the Ivanhoe Mine is the cutting for the first time on this company's leases of the celebrated Horseshoe-Boulder boundary lode. In the Horseshoe it has produced high-grade ore for several hundred feet, down to the deepest point yet reached by the 10th level.

So far as can be estimated at present, this famous lode is likely to be a great addition to the Ivanhoe output. Preparations for sinking to 3,000 ft. are being made; a new steam hoist has been put in at the main shaft, and a 36-drill air compressor plant is being erected. The ore now in sight is estimated at about 400,000 tons.

The rich shoot at the ninth level in the Oroya-Brown Hills continues to yield high-grade telluride ore, the bodies being evenly distributed over a good width. Attention is being drawn to treating the ground adjoining Hannan's Bell, on the west, beside the principal mines, and it is probable this may be done by the diamond drill.

Coolgardie.—This camp is looking up again. I believe old Coolgardie (or its vicinity) will yet produce some payable and permanent mines, though Mr. Curles' prognostications in his "Gold Mines of the World," anent the surface formations, is probably correct. Outside the Kalgoorlie fields, many good developments are reported showing steady progress and increased output. The Murchison field, owing to the Great Fingall Mine, still attracts, but the great wave is capital to test many of the old mines in depth. The mines department is considering a grant to assist some holders of leases. Many good producers in the past, never having been tested below water level.

The Great Fingall has an up-to-date plant, and with its large machine shops, blast furnaces, etc., is enabled to do all repairs without delay. The proposed erection of 20 more stamps will not go on till the company's meeting in London has finally settled the management difficulties, caused by its late secretary, A. S. Rowe.

Donnybrook Gold-field.—This field, which lies in the southwest district of this State, near the Collie coal fields, has been a disappointment. A large area of leases, which has been worked for some time by Germans, who have now discharged most of their men, is to be tested to the 500-ft. level before being finally abandoned. The same men have now taken over a large area on the Greenbushes tin-field.

The Collie coal mines appear to have settled their differences with their men and the government, the latter having made fresh contracts with owners for a portion of its needs.

Greenbushes Tin-fields.—These fields look like a success at last. They were discovered in 1888, and the shallow alluvial deposits were washed vigorously for several years, with satisfactory results. In some instances hundreds of tons of black oxide of tin being obtained from area of 20 or 30 yards square. The fall in tin prices and the rush to the gold-fields after 1889 caused development to slacken. In 1897, however, tin having gone up attention was again directed to the field. Leases and claims were again taken up, chiefly by working miners, but operations were still confined to shallow alluvial deposits. The question of lodes was then discussed, but machinery was necessary. In 1900 several companies were formed on a fairly large scale, and these are now at work.

In two instances, at least, true stanniferous lodes have been found, from which crystalline tin ore has been obtained. The yield so far is from 75 lbs. and upwards of black oxide to the ton of lode material treated. Assays of the black oxide from the alluvial wash and the lodes give from 64 per cent to 73 per cent of pure tin. There are now two smelting companies at Greenbushes. To meet the difficulty of the uncertain water supply, two of the companies are constructing works for conveying water from the Blackwood River, a distance of 6 miles.

Sydney, N. S. W. April 28.

(From Our Special Correspondent.)

Victoria.—For the first quarter of this year the gold yield of the Ballarat District was 12,821 oz., compared with 14,953 oz. for the previous quarter. The "Star of the East" was again the principal producer, with a yield of 2,167 oz. Only three companies paid dividends, viz., Lanberris, Lanberris No. 1, and Sebastopol Plateau No. 1 amounting to £2,000.

The wages dispute at the Jumbunna and Outtrim coal mines, which resulted in a strike in January that has affected 1,000 hands, has entered a new phase. The mine owners have decided to employ wages men throughout the mines instead of piece hands, and are offering 9s. per day of 8 hours.

Tasmania.—The directors of the Tasmania Gold Mining Company, Beaconsfield, have refused a third offer of an English corporation to purchase the mine. The board now proposes to increase the capital to £400,000 to enable the mine to be properly worked.

Mr. William Knox, who recently went to London to arrange terms for the amalgamation of the Mount Lyell Mining and Railway Company with the North Mount Lyell Company, has cabled to his co-directors to the effect that negotiations have fallen through, as he failed to secure terms which he considered equitable.

The new high-level tunnel, 976 ft. long, connecting the high-level dumping tail-race from Briseis Hill with the southern end of this hill, has been completed.

New South Wales.—The Sydney Harbor Collieries, Limited, a London company, has agreed to reconstruct. The company is now obliged by law to connect its 2,880-ft. shaft with the Jubilee shaft (for ventilation), which is only down some 300 ft. Besides the cost of actual mining work, there has been much expense to form a deep-water quay 580 ft. long, and also in the erection of powerful machinery and surface buildings.

Further satisfactory crushings are reported from the Bark Hut field near Gundagai, where 15 tons were treated for an average of 34 dwt. per ton. Nearly every claim on the field is now on payable gold.

Johannesburg, Transvaal. April 30.

(From Our Special Correspondent.)

One of the grievances of the uitlanders was the way coal was handled. Many attempts were made to build a line from the coal mines direct to the gold mines, but Kruger was obdurate and the scheme failed. Some one had a monopoly of sacks, and the coal had to be packed into sacks and transported to the gold mines. For every sack lost, a charge of 6d. (12c.) was made. Now a coal line is being completed, which will deliver the coal direct to the bunkers. During the construction of this road, the only practicable way to handle coal, on account of the scarcity of live stock, was by traction engines, and in consequence the public roads about Johannesburg are in bad condition. The roadbed for the new line was begun shortly after the entrance of the British, but on account of a scarcity of labor the rails are just being put down now. Thirty-ton trucks, with bottom discharges are used, and by spurs coal can be dumped directly into the bunkers at the mines. The coal line is run by the government railroad department.

New coal fields will be opened up in the Transvaal, but this line will be used to deliver coal to the whole length of mines, about 40 miles.

From an engineering point of view there is little of special interest in the construction of the line, which runs along the reef. Iron cross ties (or "sleepers," as they are called here) are used instead of the wood. The rails are placed in slots made in the sleepers, and securely wedged with iron wedges. This road, like most in South Africa, is narrow gauge. Iron sleepers are used instead of wood, because of the very heavy cost of timber of all kinds landed in Johannesburg. It was determined as 356 per cent higher than the initial cost, some time ago. For the most part the line traverses mining ground not yet in active operation.

GENERAL MINING NEWS.

CALIFORNIA.

AMADOR COUNTY.

Central Eureka Mining Company.—This mine, at Sutter Creek, W. R. Thomas superintendent, paid $87,657 in dividends last year. Most of the ore came from the 1,900 and 2,000-ft. levels, and the total cost of mining and milling per ton was $3, as against $4.47 the previous year.

Emmons.—Cranmer Brothers, owners of this mine at Pine Grove, intend moving their mill from Elsie Creek if the mine continues to prospect as well as at present.

Kennedy Mining and Milling Company.—At this mine, at Jackson, J. F. Parks superintendent, 70 stamps are running and 10 more will soon start. It will be some weeks before the new hoist is ready.

South Eureka.—The 20-stamp mill near Sutter Creek, John Truscott superintendent, has started after an idleness of several weeks.

CALAVERAS COUNTY.

Benson.—The recent strike in this mine, near Angels, is considered important, as it is in a practically undeveloped section of the district. The shaft will be sunk to 220 ft., and then cross-cutting will begin. John C. Benson, president of the company, is in charge.

Golden Eagle.—A company has been formed to work again this mine, near Sheep Ranch.

Pioneer Chief and Illinois.—Work is to begin at once on these mines near San Andres. B. K. Thorn is manager. There is some machinery on the Illinois and more has been ordered for the Pioneer Chief.

Shepherd.—A new 6-stamp mill has been shipped to this mine.

EL DORADO COUNTY.

Independence.—A 2-stamp mill is being erected on this mine being developed by Schiff, Croft & O'Brien.

FRESNO COUNTY.

Copper King Mining Company, Limited.—The United States Circuit Court has been petitioned by the attorney of the San Francisco Board of Trade on behalf of San Francisco creditors to declare this company a voluntary bankrupt. The liabilities are given as about $614,000 and the assets as $250,000.

INYO COUNTY.

H. Stovall and Charles Coyle have five men at work on a prospect, near Bishop, and expect to put up a Kinkead mill.

Leidy Mining Company.—A lot of personal property at Bishop has been sold under attachment issued on behalf of U. G. Smith.

KERN COUNTY.

Ferris & Sanford are sinking 100 ft. below the 350-ft. level on their mine at Caliente. They expect to sink to 1,000 ft., and have pumps and hoist to do this.

California Mining Company.—This company, operating the Hanson Mine at Granite, about 20 miles from Bakersfield, obtained $1,500 from the first five days' run of its new 5-stamp mill.

Five Metals Mining Company.—This company in Spangler District, 18 miles from Randsburg, has made a good strike in the Donegal claim, the product being mainly silver.

Gold Peak Mining Company.—Operations will be resumed on the Zada Mine at Caliente, which has been under bond to the Western Exploration Company. The bond expired on May 15.

Tekla Mining Company.—This company, A. J. Henderson president, has been organized to work in Analie District, about 25 miles from Caliente. A mill is to be erected at once.

Yellow Aster Mining Company.—The ore in the winze in this mine at Randsburg is improving.

MARIPOSA COUNTY.

Austin Group Mining Company.—More miners have been set at work in the mines at Whitlock. A tunnel will be run from the Golden Gate through the Coronado to connect with a shaft being sunk on the Ragan claim. The different ledges will thus be opened about 300 ft. deeper than at present. A. L. Horner is secretary.

Mariposa Commercial and Mining Company.—The county assessor has raised the assessed valuation of this company's mines to $833,000, or over $500,000 more than the previous year. The company thinks the valuation too high and will bring the matter before the Board of Equalization.

NEVADA COUNTY.

Alta California.—This gravel property, G. W. Root manager, will be opened by a tunnel to tap the old Blue Lead channel. The company will explore the ground to find the famous lead skirting Alta Hill, north of Grass Valley.

Central.—This old mine, near Grass Valley, has been bonded to San Francisco men, who will begin to work it. The mine formerly yielded very rich ore.

Gray Eagle.—The new 10-stamp mill at this property at Washington, H. Kaler superintendent, is ready to start. A flume is being built to supply water.

Grizzly Ridge Mining Company.—Work is progressing favorably on two claims at Washington. C. J. Schuster, superintendent. Tunnels are being run on both the Adriatic and Niantic claims, and when the vein is located machinery will be erected.

La Belle.—This mine, in Willow Valley District, has been bought in at sheriff's sale by Fred Searls.

Orleans.—Some good ore has been recently taken out of this mine, at Grass Valley, by tributers, yielding $24 per ton. Development work is being pushed by Superintendent C. A. Breckington.

St. Gothard Mining Company.—Considerable development work is being done at this mine at Columbia Hill, G. Kartschoke superintendent. Some new machinery is being installed, including a new pump and taking out ore will commence soon.

South Idaho.—At this mine, Grass Valley, Superintendent Carter is taking out very rich ore from the old workings. The mine has been pumped out and development work has commenced.

ORANGE COUNTY.

California Iron and Steel Company.—This company is preparing ground at Newport Beach for the smelter. Contracts for general construction work have been let.

PLUMAS COUNTY.

Butterfield.—This claim, owned by J. H. Butterfield, of Oroville, Butte County, has been sold to a company of men from Santa Cruz, Santa Cruz County.

SAN BERNARDINO COUNTY.

A ledge has been discovered about eight miles south of Amboy, a station on the Santa Fe Railroad, by M. Proff, of Daggett, and P. King and S. Alf, of Ludlow. Eight claims have been located.

Carleson Mining Company.—Men have been sent by this company to sink a 100-ft. shaft on its Chappel group at Oro Grande.

Gold Peak Company.—A depth of 100 ft. has been attained on its claim.

SAN DIEGO COUNTY.

San Diego Smelter.—Two car-loads of machinery have arrived at San Diego for the smelter proposed to be erected at San Diego Bay. L. W. Morgan represents the company. This is the same smelting plant which was to have been erected at San Pedro and there is still some doubt as to exact location, money being required by the company before the furnaces are put up. The city of San Diego is to raise $3,500 for land for the smelters.

SHASTA COUNTY.

Balaklala.—There is considerable activity at the mines near Kennett, and a number of buildings are being erected. Manager W. W. Adams has 50 men employed at the mines. A sub-station for transformers will be built at the mine and a power house for the motors.

SISKIYOU COUNTY.

A number of quicksilver claims have recently been located on the West Fork of Beaver Creek, near Garretsons Mineral Springs.

B. A. Cardwell, of Yreka, has organized a company at Denver, Colo., to develop certain coal lands 7 miles north of Yreka.

Greenhorn Blue Gravel.—This mine, near Yreka, has been nearly drained. The mine had been idle for nearly two years.

Hazel Gold Mining Company.—This company is generating electrical power for its Hazel mine, Siskiyou County, and for its Gladstone mine, French Gulch, Shasta County. The electric motor has been shipped to its destination on Clear Creek, near Tower House.

King and Santa Cruz.—J. S. Lowden, Jr., has bonded to C. Tucker, J. S. Beckey, L. L. Rees and B. A. Cardwell, the King, Santa Cruz and Monterey hydraulic claims at Hamburg Bar. The new owners have located about 10 miles of ground near Hamburg, and will build a ditch from Scott River to supply water.

SONOMA COUNTY.

Socrates.—This quicksilver mine, over which there is much litigation, has been relocated by Percy and Edna Kinard. Suit has been commenced to declare the patent to the Socrates invalid on account of fraud in its procurement. The relocation is a precautionary measure in the event of the court declaring the patent void. The attorney declare that certain of the original locators of the claim were excluded from participation in the patent proceedings, and by name in the patent.

TRINITY COUNTY.

Miner's Dream.—It is expected that Mark W. Musgrove will soon start development on this claim. A 20-stamp mill is also contemplated.

Sweepstake Mining Company.—This company before abandoning its famous hydraulic mine, near Weaverville, purchased a patent gold-saving plant in Chicago, which cost, delivered at Redding, about $34,000, but was never set up or used. It has just been sold for old iron to the Redding Iron works for $750. The plant weighed 50 tons.

YUBA COUNTY.

Willow Creek Consolidated.—The California Debris Commission has received application for license to mine by hydraulic process at this mine, near Camptonville. F. Mills is the applicant.

COLORADO.

CLEAR CREEK COUNTY.

Aliunde.—The last shipment which will be made from the Haggart lease on this mine was sent to the sampling works recently. Twenty tons netted the leasers and company $6,500. Another lease on the lode between the 8th and 9th levels has been given, which, it is expected, will pay as well as the Haggert. The company will commence sinking the shaft 100 ft. deeper.

East Red Elephant.—Work is being steadily pushed on the tunnel. The company intends installing additional machinery. R. C. Vidler, of Lawson, is manager.

Joe Reynolds.—There are 18 men employed on this Lawson property. The tunnel, which is now in 3,600 ft., is being driven to reach the old shaft, about 250 ft. distant. The cost of driving the tunnel is given at $10.50 per ft.

Last Chance.—This mine, on Silver Creek, near Lawson, is being worked by St. Louis men under Mr. Stannish, of Lawson. A new boiler and hoist have been installed, and six men are employed.

Republic Consolidated.—It is reported that work is to be begun soon on a 200-ton concentrating and cyanide plant for this company at Empire.

FREMONT COUNTY.

Copper King Free Gold Mining Company.—Operations have been resumed at its Dawson City mines.

EL PASO COUNTY.

Portland Gold Mining Company.—This company filed recently in the District Court at Colorado Springs an answer and cross complaint to the suit brought against it by Lewis B. Skinner, formerly superintendent of the Portland Mill for $25,458.34, for alleged violation of contract. The answer denies the chief allegations of the complaint, moving that the case be dismissed, and makes demands for damages.

GUNNISON COUNTY.

Enterprise.—This mine, in the Tin Cup District, recently encountered some rich ore in the 3,000-ft. tunnel level. A large force is employed on development. The property is owned and operated by the Taylor Park Mining Company.

Baldwin Coal Company.—Two actions for damages have recently been filed in the district court by this company, one against the Colorado & Southern Railway Company, the other against President Trumbull for granting unreasonable discrimination to a rival coal company in transportation. The defense filed a denial, and pleads that it is under no legal obligation to furnish transportation facilities on the plaintiff's side tracks.

Pure Gold Mining and Milling Company.—Work has been resumed on this company's property south of Gunnison. The main shaft, down 240 ft., is being sunk deeper.

Revenue.—Extensive development is being carried out on this mine, in Box Canon District.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

The owners of different Breece Hill properties containing large deposits of low-grade siliceous ores that cannot be treated profitably, are considering the erection of a large cyanide mill. T. C. Cayles, of Salt Lake, has been here looking over the situation and believes the mill can be operated successfully.

Bonanza Mining and Development Company.—Manager Terry Connors is preparing to run a tunnel into Elk Mountain, near Kokomo, beyond the present 2,000 ft. of work.

Diamond Gold Mines Company.—As soon as the new surface plant is in place shipments will amount to 125 tons daily. The drift is opening up a large ore-body of shipping grade.

Greenback.—Rumors state that the owners will soon start up this property, and that the Rialto will be secured. The management denies the report. It is believed that a deal is on for resuming work on the Greenback.

Ibex.—About 250 tons of all classes of ore are shipped daily, most of which is handled through No. 2 shaft. Arrangements are on foot for sinking No. 3 shaft, now 800 ft. deep, 450 ft. more, while No. 4 shaft is being sunk to connect with the Yak tunnel.

London.—More strikes are reported. The latest is in the south tunnel in an interior shaft sunk at 130 ft. in the lime. A streak 18 ins. wide carries 35.74 oz. gold, 10.3 oz. silver, and 23.8 per cent lead.

Midas.—Shipments are only about 150 tons daily, as much time is being given up to development work and running of drifts. The Midas will soon be in position to ship more heavily.

SAN JUAN COUNTY.

(*From Our Special Correspondent.*)

American.—The Gold King and American tunnels are being connected by a winze. When it is completed the output from both mines will go through the American tunnel.

Bald Eagle.—Carver & Butler have 5 ft. of lead carbonates, carrying considerable silver values, and are shipping regularly.

Big Colorado.—An important strike is reported on this property, near Silverton, believed to be the Paul B. vein.

Eureka Exploration Company.—A 200-ft. contract has been completed, and another will be let, both to cut the Cascade vein and open up the Ridgway ore shoot. Work has been resumed on the upper workings of the Ridgway, and some rich ore is being broken.

Lady Ellen.—Joseph Bordeleau is preparing for an active esason's work on this claim. The lower tunnel is now in 107 ft., and shows good values in silver.

Marcella Tunnel.—John Woods is pushing work on this tunnel one mile below Silverton. The breast is in 600 ft., and in an undeveloped territory.

SAN MIGUEL COUNTY.

Japan Mines Company.—The large cross-cut tunnel, 7 by 8 ft., is fast nearing the Japan vein. It is in between 2,600 and 2,700 ft., and it will cut the vein 640 ft. below the lowest of the upper workings and nearly 1,000 ft. below surface. If the vein is as large and rich as in the upper workings, a conditional sale to Boston men for $500,000, which has been pending for months, will be consummated. The ore runs in gold, silver and lead, and with the exception of the high grade, which is shipped to smelters crude, is fine concentrating material. T. Walter Beam, of Telluride, is manager.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Altman Fire.—The greater portion of the business part of the town of Altman was destroyed by fire recently. The fire is supposed to be of an incendiary origin. The town is a small one on the top of Bull Hill, and is one of the oldest in the district. The shaft houses of the Pharmacist, Burns and Free Coinage mines had narrow escapes from being burned. The town was noted in the early day for being the headquarters of the striking miners in 1894. The place was fortified for some time, and held by about 1,500 armed miners.

Cripple Creek Enterprise Gold Mining Company.—Work is in the new gallows frame, and no development work is being done. The shaft is now about 200 ft. deep.

C. K. & N. Gold Mining Company.—Good ore continues to come from the lowest level of the Raaler claim. The property is under lease to Horace Granfield. The company recently paid another dividend of about $15,000 from royalties paid by lessees.

Doctor-Jack Pot.—The suit of Mr. S. Bailey v. A. E. Carlton before the district court for $22,500 for commission in the sale of the Doctor and Chief claims to the Doctor-Jack Pot Company, resulted in a verdict for the defendant.

Fluorine.—Several shipments have been made from this Copper Mountain lately, and as far as can be determined the ore is fair grade. About five years ago the mine shipped considerable ore, but not since, until recently. The property is worked by the Sioux Falls & Cripple Creek Company. Considerable work has been done on the Fort Wilcox tunnel, but it is understood that no ore has been found there. Richard Blanchard has charge.

Gold Hill Tunnel.—This tunnel, near Cripple Creek, is not used much for mining, but some enterprising citizens have leased it, and large numbers of tourists that visit the district every year have the privilege of going through the tunnel on paying a small sum. The tunnel is about 3,000 ft. long, and connects with the Anchoria-Leland, also the Moon-Anchor and Midget.

Golden Cycle Mining Company.—The suit between the majority and minority stockholders has been heard before Judge Lewis in Colorado Springs this week. The suit is principally for the appointment of a receiver and is the result of quarrels between the directors. The mine is in splendid condition, and is shipping a large amount of ore.

Indicator Gold Mining Company.—A very good showing is reported on the Nightingale claim, though nothing wonderful has been found from a shallow shaft sunk by some lessees. The claim adjoins the Mary Navin on the West, and is on Rose Bud Hill, across the gulch from Beacon Hill.

Isabella Gold Mining Company.—No work is being done on company account, and it is rumored that the company will lease the whole property to some large syndicate. This property has not opened since the strike. A number of lessees are at work. The company owns a large acreage on Bull Hill, and has shipped a large amount of ore, including probably the richest shipment that ever went out of the district.

Old Gold.—The lessees on the Buckeye claim of this company are at present erecting an ore house on the property. Another shipment has been made recently which is reported to be as good as the former ones. This vein is not the same as the C. K. & N., which a great many people appeared to think, when the ore was first discovered.

Portland Gold Mining Company.—From appearances this company intends to do considerable work. One of the largest compressors in the country is being installed, and one shaft is to be fitted with skips. At present the property is worked by three shafts, the Burns, the No. 2 and the No. 3.

State School of Mines.—The senior class of the State School of Mines was visiting in the Cripple Creek District the first part of the week upon their annual tour of the mining districts of the State. The class, which numbered 27, was in charge of Profs. Hill, Stockton and King. Visits were made to the Portland, Golden Cycle, Vindicator, Mary McKinney and El Paso mines, which, through the courtesy of the managements, were thrown open to the students. The large reservoir and electric plant at Skagway were also visited.

Stratton's Independence, Limited.—The new boiler on this property has been put in, and the mine again has plenty of steam, of which it has been short for some time. It is understood that considerable work will be undertaken.

IDAHO.

IDAHO COUNTY.

F. E. Johnesse, superintendent of the Thunder Mountain road, has let a contract for building it to the Northwestern Bridge and Construction Company, of Boise, for $36,000. The road starts from Long Valley, near Van Wyck, is 70 miles long, and is to be completed by September 15.

Crown.—This group of six claims on Big Creek, in the Thunder Mountain District, has been bonded by W. S. Keeler, the owner, to W. A. Stevens, of New York City, for $25,000.

South Fork Placers.—This property, consisting of about 250 acres on the south fork of the Clearwater, 12 miles from Grangeville, is being developed. Three miles of ditch are being constructed. H. Madgwick has charge.

Sunnyside.—A very rich strike is reported in this mine at Thunder Mountain. Mr. Abbot is superintendent and Mr. Purdum manager.

NEZ PERCES COUNTY.

Jumbo.—This mine, one of the principal producers in the Buffalo Hump District, is adding 10 stamps to its 4-stamp mill, and has ordered 10 stamps more.

SHOSHONE COUNTY.

Golden Chest Mining Company.—The 20-stamp mill on this company's property at Murray is reported making a good output. It is said that the mill will be enlarged to 60 stamps.

INDIAN TERRITORY.

CHOCTAW NATION.

Rock Island Coal Company.—The mines of the C. O. & G. R. R. Company, at Harthorne and Gowen, which have for several years been operated under contract by the McAlester Coal Company, have been acquired by the Rock Island Coal Company. The officers, are: President, Carl Scholz, Little Rock, Ark.; vice-president, R. A. Jackson, Chicago, Ill.; secretary, J. L. Cramer, Chicago, Ill.; treasurer, F. E. Hayne, Chicago, Ill. The mines are to be equipped with new and modern machinery. The other mines of C. O. & G. R. R. Company will also be turned over to the Rock Island Company, making a total output of about 50,000 tons per month to begin with, which will be increased largely in the near future. Plans are being prepared for new mines and bids for equipment will be solicited from the representative manufacturers. Carl, Scholz, president, Little Rock, Ark.

ILLINOIS.

SANGAMON COUNTY.

(*From Our Special Correspondent.*)

Barclay Coal Mining Company.—This company, George N. Black, of Springfield, president, is equipping its mine at Barclay on the Wabash Railway with electric haulage.

Springfield & Chicago Coal Company.—This company recently organized at Springfield, has elected the following officers: Harry Devereux, of Springfield, president; Thomas O'Gara, Chicago, vice-president; George Streble, mine inspector, of Macoupin County, is superintendent. The company has located its shaft on the Chicago & Alton Railway, about 4 miles northeast of Springfield, and will begin sinking at once.

VERMILION COUNTY.

(*From Our Special Correspondent.*)

Big Four Coal Company.—This company, William Hortshom general manager, has finished its shaft, and begun shipping coal.

Southwestville Coal Company.—This company, Wm. G. Halbert, general superintendent, is sinking a shaft at Westville preparatory to opening another mine. The shaft is 9 ft. by 16 ft. inside of timbers.

MICHIGAN.

GOGEBIC RANGE.

Corrigan, McKinney & Co. have been doing extensive work on this range. Sinking is being continued on the shaft at the Colby, and at 575 ft. the fourth level is being opened. The Ironton will be placed soon on the shipping list. The Meteor is stocking some ore.

Iron Belt.—This mine has been worked out and will be abandoned at an early date. The mine began producing in 1889, when 30,000 tons were shipped. The total shipments have been 1,092,507 tons.

MARQUETTE RANGE.

Bessie.—Work is being carried on on the fourth level of this mine. The ore is low grade.

Cleveland Cliffs Company.—A 3-compartment shaft has been started on the Austin property in the Swanzey District, near the Princeton Mine.

Volunteer.—This mine, operated by the United States Steel Corporation, has discontinued shipping ore until the new crushing plant at Escanaba is completed. The ore is being stocked at the mine. About 130 men are employed underground.

MISSOURI.

JASPER COUNTY.

Joplin Consolidated Mining Company.—J. B. Quinn, president of this company; J. F. Wise, vice-president, and C. W. Glover, secretary and treasurer. A dividend of 5 per cent was recently declared.

ST. FRANCOIS COUNTY.

(*From Our Special Correspondent.*)

The new electric road being constructed from De Lassus through Farmington to the Flat River lead country, is graded as far as Esther or the Columbia Mine, and the track is laid as far as Farmington with 60-lb. T-rails. Work is temporarily discontinued until some more bonds are placed, which are based on $10,000 per mile, in addition to $40,000 obtained through sales of stock.

St. Joseph.—Forty cars of lumber have been ordered for the new concentration mill to be erected at the Hoffman or No. 12 shaft. The mill is to be equipped on new ideas that promise great improvements over the old 1,500-ton mill at Boune Terre.

MONTANA.

CASCADE COUNTY.

Cottonwood Coal Company.—A crusher and washing plant is being erected at Stockett, and, it is expected, will be in operation about July 1. The company is also building a trestle 2,000 ft. long to connect this plant with the Minneapolis coal lands. With the new plant and trestle completed the company expects to produce about 2,000 tons per day.

Gerber.—This coal mine, at Sauk Center, is preparing to increase its output. The management has erected a large boiler house, and now are installing four 90-h.p. boilers, one 250-h.p. engine, one 12-h.p. engine, a compressor, 6 new drills, 6 coal cutters and 2 jumps. It is expected that the plant will be completed by June 15, and that the output will be about 700 tons per day.

FLATHEAD COUNTY.

Way-Up.—A shipment of galvanized iron piping, a waterwheel and attachments and a fan arrived in Libby recently for this mine on Gold Mountain, between the headwaters of Libby Creek and the West Fisher. The property is being systematically developed by its owners, Joseph Riley and James Higgins, of Butte, and associates. It is planned to run about 450 ft. of tunnel this summer under O. C. Thomason.

FERGUS COUNTY.

Gold Reef Mining Company.—About 20 men are employed on development besides the force installing roasters in the mill. It is expected that the mill will be ready by August 1, and will have a capacity of about 150 tons daily.

Kendall Mining Company.—The mine is reported as netting between $25,000 and $30,000 a month since December, and paying $15,000 a month in dividends. The property is well equipped, and is worked by Finch & Campbell, who purchased it about two years ago.

GALLATIN COUNTY.

International Mining Company.—Work is being pushed on the properties at Springhill. A contract has been let to C. K. Hardenbrook to drive the tunnel an additional 150 ft. A vein of low-grade copper ore has been uncovered.

GRANITE COUNTY.

Hasmark.—A rich strike is reported on this property, being developed by J. C. McCleod.

JEFFERSON COUNTY.

Gaffney.—This group of six claims, near Wickes, has been bonded by Hugo Frylor, of Corbin, to an Eastern syndicate for $50,000. The ore is said to be copper and silver principally. A 100-ton concentrator may be erected near the mines.

(*From Our Special Correspondent.*)

Gray Eagle.—August Freeburg, of Basin, who has worked this property for the past 18 months, confining his work to the upper levels, is preparing to pump out the shaft.

Rose Gold Mining Company.—This property on Golconda, 26 miles from Helena and 5 miles from Jefferson, will be equipped with a stamp mill during the summer, it is reported.

LEWIS & CLARKE COUNTY.

United States Smelting and Refining Company.—A report filed by this company shows assets of $40,000, with no liabilities. The company was organized under New Jersey laws, but has gone out of business.

MADISON COUNTY.

Standard.—A shipment of 10 tons of ore from this mine in Pony Gulch to the East Helena Smelter, gave

$3[illegible].40 per ton. The property was worked by Jas. Pollard, unassisted.

Vermilion Placer Mining Company.—On this property of eight claims, aggregating 160 acres, on Vermilion Creek, 40 men during the winter have been busy. A tunnel 515 ft. long by 12 ft. wide has been run and a mile pipe line laid. The outlook is said to be promising. The company is composed of Western men, who purchased the property for about $50,000. John Gerrick is president.

Watesca.—This mine, at Rochester, is said to be turning out about $75,000 per month. The ore is treated at the company's mill.

SILVER BOW COUNTY.

Amalgamated Copper Company.—At the annual meeting in Jersey City, N. J., on June 4, the following directors were elected: Henry H. Rogers, William Rockefeller, James Stillman, Anson R. Flower, Frederic P. Olcott, Albert C. Burrage, William G. Rockefeller, of the old board, and George H. Church, who succeeded Robert Bacon, who asked to be excused from service another year on account of his health. Harmon B. Graves, of the firm of Laster & Graves, New York City, who said that he represented New England stockholders, holding 400 shares of stock, who desired to ask certain questions based upon reports of the company's finances and operations which appeared in the Manual of Statistics and public print; that as the company made no report of its operations at its annual meeting, and this was the only way stockholders could verify such statements. Mr. Graves read a list of 13 questions, covering the prices paid by the Amalgamated for its holdings, the purchases of Butte & Boston and Boston & Montana companies, the ownership of controlling interests in these companies by people who were directors of the Amalgamated Company; the expenses of the present litigation at Butte; the amounts spent by the Amalgamated Company for the year other than for the operation of the mines and works, and in litigation, etc. Mr. Graves' questions were tabled by a vote of 1,056,711 to 1,204 shares.

(*From Our Special Correspondent.*)

Anaconda Copper Mining Company.—The regular annual meeting was held recently at Butte, and the old board of trustees were re-elected as follows: William Scallon, H. H. Rogers, William Rockefeller, A. C. Burrage, William G. Rockefeller, E. C. Bogert and W. L. Bull. The board will meet later for the election of the officers.

Brittania.—This property, in the Silver belt, southwest of Butte, has been secured by E. A. Wayne on a lease. While the company operated the mine it produced $225,000 from above the 200-ft. level, paying dividends of $45,000. Mr. Wayne has a lease for 18 months, with an option on the bulk of the stock. The lease calls for a royalty of 20 per cent on all ore shipped, having a net value of $50, and better, and 10 per cent on all ore with a lower value. The property is equipped with a good outfit of machinery, including hoist, boiler, compressor, pumps and a supply of tools, etc. The equipment goes with the lease for a nominal rental of $60 per month. The shaft is sunk 400 ft., but no stoping has been done below the 200. Returns from the first-class ore shipped have shown a value of from $60 to $200 per ton. The ore is a manganese quartz, the values are principally silver, with a gold content of from $10 to $30.

Nipper Consolidated.—This company recently filed a petition in the district court against the Parrot Company, asking the court to issue an order requiring the latter company to show cause why an inspection, examination and survey of the Parrot Company's underground workings should not be granted.

Speculator.—This property is producing somewhat over 500 tons daily, the first-class ore going principally to the Amalgamated works at Anaconda.

OREGON.

BAKER COUNTY.

California.—R. L. Bellman, Sumpter, is manager of this mine, which shows 6 ft. of ore above average value, opened by surface cut at the apex of the dike.

Connor Creek.—J. Myrick, Connor Creek, has a bond on this property, of which he was superintendent for years. The bond includes the 35-stamp mill and other equipment.

Emma.—W. L. Vinson, Baker City, is manager. The 5-ft. Bryan mill recently installed is running on ore from the tunnel level.

Gold Reserve Company.—Development has begun on this group of claims, lying between the Bonanza Mine and the Gladstone, in eastern Oregon, under W. H. Meade, one of the directors of the company. The officers and directors are: Dr. F. W. Hilcher, Spokane, president; Dr. M. D. Molliter, Spokane, vice-president; C. T. Newcomb, Spokane, secretary, and C. P. Oudan and W. H. Meade, directors.

Sumpter Sampler.—J. Arthur and A. L. McEwen, Sumpter, have purchased machinery for a testing mill, a 5-stamp battery, with concentrators, cyanide and chlorination applinances.

Sumpter Smelter.—This plant practically is finished, and Manager E. W. Mueller asks operators to furnish ore.

Tempest Mining Company.—A reorganization of this company is being effected, so as to raise additional capital for mine machinery and a 10-stamp mill. The company operates the Tempest Mine in the Greenhorn District.

Virtue.—The working shaft is about 270 ft. deep, and has not encountered more water than was had in the old shaft. Arthur Buckbee, Baker City, is manager.

Virtue.—This mine, 8 miles east of Baker City, is to have its 3-compartment shaft sung from 400 ft. to 1,000 ft. The Virtue Consolidated Mines Company, owner of the property, has let a contract to W. H. Potter, to move the Cumberland Mill from Silver City, Idaho, to the Virtue Mine, and rebuild it.

GRANT COUNTY.

(*From Our Special Correspondent.*)

Alamo.—J. P. McGuigan, Alamo, manager, has commenced work on the stamp mill.

Dixie Meadows.—L. C. Reese, of Prairie City, is superintendent. Orders have been placed for a 100-ton concentrating plant, including 100-h.p. boiler, No. 2 gyratory crusher, 16-in. roll jaw crusher, set 36 by 36 rolls, 5 concentrators, plates, electric light plant, etc., for delivery in 90 days.

I X L.—F. T. Kelly, of Greenhorn, the manager, has purchased a 5-stamp mill, concentrators and has enlarged the steam plant, for testing the ore while sinking.

Morning.—Ames, Cooper & Simmons, owners of Greenhorn, have a 5-ft. Bryan mill nearly ready for ore.

Red Boy.—The ore-body opened on the tunnel level is 5 ft. wide, and of good milling grade. E. J. Godfrey, Red Boy, is manager.

JACKSON COUNTY.

Bowden Gold Mining Company.—A 5-stamp mill and other machinery has been installed by this company at the Bowden Mine, in the Gold Hill District.

JOSEPHINE COUNTY.

Mountain View Copper Company.—This company's smelter at the Sowell copper mines in the Waldo District, is to be blown in soon.

MALHEUR COUNTY.

Black Eagle.—The 20-stamp mill at this mine, near Malheur City, started recently for the summer run. Mr. Merkle, manager, has announced that the company intends increasing the mill to 100 tons daily capacity.

WALLOWA COUNTY.

Tenderfoot.—This mine, 1 mile south of Joseph, has been taken over by Philadelphia people, who, it is reported, will erect a mill on the property.

PENNSYLVANIA.

ANTHRACITE COAL.

G. B. Markle & Co. have begun work on their coal land at Keiper's farm. A new slope, near the Jersey Central tracks, is being sunk to tap the basin and work will be pushed during the summer. The output will be hauled to Highland No. 1, where it will be cleaned and prepared for market in a new breaker.

BITUMINOUS COAL.

T. Stanton Davis recently sold to W. A. Lathrop, of Philadelphia, 3,000 acres of valuable coal land alng the line of the Ebensburg and Blacklick townships in Cambria County, for $165,000.

James W. Ellsworth & Co., of Washington County, recently purchased the Van Voorhis farm at Scenery Hill in West Bethlehem township, containing 50 acres, for $750,000.

Charter's Coal and Coke Company.—An explosion of gas in this company's colliery at Federal recently killed four men and injured many others. Reports state that the mine is on fire. About 75 men were at work when the explosion took place.

Clark Coal and Coke Company.—This Pittsburg Company, recently incorporated with $200,000 capital, is developing its property near Freeport. The company owns 2,000 acres of coal and clay lands, and in addition to mining coal and manufacturing coke, will also manufacture firebrick and fireclay products. C. B. Clark is president and general manager, and W. B. Horner, secretary and treasurer. The offices are in the Second National Bank Building, Pittsburg.

Pittston Coal Mining Company.—This recently incorporated company, capital $100,000, is now operating a colliery on the Moffet estate at Sugar Notch, and is preparing to erect other breakers there. The officers are: President, J. J. Brown, of Scranton; treasurer, M. W. O'Boyle; secretary, J. H. Foy. These, with W. H. Rutledge, of Pittston, constitute the directors.

Wabash Coal and Coke Company.—This company was incorporated recently with $10,000 nominal capital, by Carnegie and Pittsburg coal operators. About 4,000 acres of coal land between Primrose and Burgettston, on the Panhandle Railroad, and near Hickory on the Wabash, have been acquired. Four mines will be opened, having an aggregate daily output of about 8,000 tons. About $350,000 will be expended in installing compressed air and electrical machinery. The vein is at a depth of from 125 to 175 ft., and is about 6 ft. thick. L. R. Smith, of Pittsburg, is superintendent. The capital is to be increased to $1,000,000.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Mile-High Mining Company.—Development work is under way on this company's ground, in the Penobscot District.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Clover Leaf Gold Mining Company.—Exploratory work is under way in the Uncle Sam Mine, with O. B. Amsden, formerly superintendent of the Belt Development Company at Lead, as superintendent. Pipe is being laid, and a pump capable of lifting 1,000 gals. of water per minute 1,000 ft. is being installed. It will have cost the company approximately $15,000. The drift started from the sixth station level, 350 ft. long, will be continued.

Dizzy Mining Company.—This company has been organized by H. H. Francis, of Custer; E. M. Thompson, of Deadwood, and others, to prospect 200 acres of mining ground next to the Penobscot Mine at Garden City.

Galena Mining and Smelting Company.—J. D. Hardin, of Deadwood, who bought this company's property of 2,000 acres, in Bear Butte Mining District, is preparing for work. New York men are said to back Mr. Hardin.

Horseshoe Mining Company.—E. M. Holbrook will be general manager and Edward Manion will be superintendent after June 1. The former will, during the coming summer, remain in New York City. David Mallet, the retiring mine superintendent, intends going to Michigan. It is said that the new 500-ton cyanide plant will be ready during July.

Tinton Mining Company.—Plans have been prepared by the Colorado Iron Works, of Denver, for a plant to treat tin ore by dry concentration.

PENNINGTON COUNTY.

(*From Our Special Correspondent.*)

Holy Terror Mining Company.—The Keystone 20-stamp mill is running regularly on ore from the deep level of the Holy Terror Mine, after being idle five months. The company has connected the Holy Terror workings with the Keystone vein. The latter is between 40 and 50 ft. wide, and is low grade. The Holy Terror concentrates are accumulating at the mill, and will go to a smelter, as they are too high grade for cyaniding.

Fraternity Gold Mining Company.—J. E. Platt, C. A. Fountain, A. P. McMillan and other stockholders from Clark, have been on the ground, and arranging for further developments.

Old Bill Group.—H. N. Ross, of Custer, who is said to have panned the first gold in the Black Hills, while a prospector with Custer's expedition in 1874, is to sell this group. The third and last payment is due in July.

TENNESSEE.

MONROE COUNTY.

Coker Creek Mining and Milling Company.—This Chattanooga concern was incorporated recently under the laws of South Dakota, with $500,000 capital. The officers are: A. A. Strong, president; A. W. Boyd, of St. Elmo, vice-president; Dr. Frank L. Adams, secretary-treasurer; the other two directors are J. N. Adams and J. R. Stone. J. N. Adams is consulting engineer and C. M. Clark, chemist. The offices are at 16 East Eighth Street, Chattanooga. The property is near Coker Creek, and the company intends erecting a 10-stamp mill.

MONTGOMERY COUNTY.

The contractors have begun work on the Nashville, Chattanooga & St. Louis Railway's extension to Green Place, or Eastland, where are the Bon Air Coal, Iron and Lumber Company's new mines, the point from which this company will get its coal supply, from which the coke for its Clarksville furnaces will be made. The railroad is to be completed by December 1. This road opens up a fine coal and timber country, reaching as it does the Caney Fork River, which is the western boundry of the Sewanee coking vein. This river, too, is recognized as tracing the best undeveloped timber region of the Cumberland Mountain Plateau.

UTAH.

(*From Our Special Correspondent.*)

Ore and Bullion Settlements.—Settlements by Salt Lake banks during May were: Ores, $742,200; base

bullion, $662,700; gold bars, $205,000; auro-cyanides, $1,000; total, $1,610,900.

BEAVER COUNTY.

(*From Our Special Correspondent.*)

Beacon.—There is a hitch in the deal for the sale of this property, now in possession of the new Royal Gold and Copper Mining Company.

Horn Silver.—Nine cars of ore were shipped from Frisco to the Salt Lake smelters during the week ending May 15.

Majestic Mining and Smelting.—The directors have called for a loan of $350,000 for further development and for equipment of the mines. The directors agree to make up $100,000 of the amount, if necessary, and give first preference to the present stockholders to make up the balance. The money is to be secured by the company's notes, bearing 6 per cent interest, payable semi-annually. A bonus of two shares of stock for each $100 loaned is also authorized. This action was taken upon the recommendation of William A. Farish, manager.

Royal Gold and Copper Company.—President A. B. Lewis has placed an order for five gasoline engines and hoists with the Salt Lake branch of Fairbanks, Morse & Co. The company proposes to carry on much development work.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Shipments.—Shipments for the week ending June 1 were 164 car-loads of ore, as follows: Ajar, 2; Black Jack, 2; Bullion-Beck, 12; Carisa, 2; Centennial-Eureka, 7; Dragon Iron, 14; Eagle & Blue Bell, 1; Eureka Hill, 8; Gemini, 12; Grand Central, 14; Lower Mammoth, 4; Mammoth, 9; Martha Washington, 1; La Clede, 1; Star Consolidated, 4; Victor Consolidated, 3; Yankee Consolidated, 8. During the month 632 car-loads were sent to the Salt Lake smelters.

Uncle Sam Consolidated.—As soon as satisfactory arrangements can be made for water supply, Manager James Chipman, of Salt Lake, says the proposed mill will receive attention. The company is trying to get water from the Bullion-Beck and Champion companies.

SALT LAKE COUNTY.

Bingham Shipments.—Not including the United States, Bingham Consolidated and Utah Consolidated properties, the Bingham shipments for the week ending May 15 were: Dalton & Lark, 1 car; Sampson, Moscow and Mountain Gem, 2 cars each.

Columbus Consolidated.—This Alta company has filed notice with the State engineer of its appropriation of certain waters of Little Cottonwood Creek. This is a preparatory move for the erection of an electric power plant and concentrator. Tony Jacobson, of Salt Lake, is manager. The company has over $30,000 in its treasury.

De La Mar—Wall.—It is announced that the deal for the sale to the United States Reduction and Refining Company, of Colorado, is practically closed. Manager D. C. Jackling, of the latter company, made a final examination of mine this week. Col. E. A. Wall will retain a one-fifth interest.

Moore Cyaniding Company.—This organization recently incorporated at Salt Lake, appointed the following officers: Enos A. Wall, president; Frank Knox, vice-president and treasurer; Warren C. Bogue, secretary; George Moore, manager; the other director and incorporator being Rudolph J. Decker. The company owns contracts and patent rights in United States, Mexico and various English colonies. The capitalization is $1,200,000, in shares of $100 each. The company controls the inventions of Geo. Moore for the recovery of gold from crude ores, tailings, slimes, etc. The process was ordered installed at the Consolidated Mercur Company's mill recently.

United States Smelter.—Four out of the five furnaces have been started again after dispensing with the automatic feeder system. The aerial tramway to the mines has been overhauled.

Utah Apex.—This company has taken over the York Mine, of Bingham, on a basis of $1.50 per share. The second payment on the purchase price has been made. Walter Orem, of Salt Lake, is manager.

Utah Consolidated.—Shipment from the Highland Boy Smelter for the week ending June 1, were 5 cars, or 300,000 lbs., copper bullion.

Yampa Smelter.—Contracts have been let for machinery for this Bingham plant, and work will start June 1. The constructing engineer is J. M. Callow; the consulting engineer, James W. Neill, both of Salt Lake. Connection has been made with the upper and lower workings.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

Park City Shipments.—Shipments of ore and concentrates for the week ending June 1 were: Comstock, 17,000 lbs.; Daly West, 3,181,000 lbs.; Silver King, 1,274,960 lbs.

Daly-Judge Mill.—This plant is closed pending installation of the Sherman slimes process. The work will be completed about June 20.

J. I. C.—The new pump is installed and good progress is being made sinking below the 400 level.

WEST VIRGINIA.

KANAWHA COUNTY.

Judge Jackson, in the Federal Court, recently at Charleston found Miles Queensbery, Willoughby Miller, M. L. Nelson and V. B. Nelson, all miners, guilty of contempt and fined them each $50, and gave them a jail sentence of 40 days. They were charged with violating the Keller blanket injunction by trespassing on the property of the Raleigh Coal and Coke Company.

Kelley's Creek Colliery Company.—This company has been incorporated with a capital stock of $500,000 to develop and operate 8,000 acres of coal land in the Cedar Grove District. Developments are to begin at once. The company expects to operate about 10 mines, and about eight miles of standard gauge railroad, with facilities on the Great Kanawha River, and to have a capacity within two years of from 2,000 to 3,000 tons of coal daily. J. W. Dawson, at Cedar Grove, is general manager.

Scott Colliery Company.—This recent West Virginia incorporation has secured a tract of over 800 acres on the Open Fork of Bell Creek, in the Kanawha region, and is preparing to begin operations. A branch of the Chesapeake & Ohio passes near the proposed openings, to which a spur will be extended. It is expected that shipments will begin in about three months.

LOGAN COUNTY.

C. Crane & Co., of Cincinnati, recently purchased 13,000 acres of coal and timber land on Guyandotte River, 12 miles from Logan, for $260,000, and intend developing the property. The owners were George F. Miller, Thomas H. Harvey and Neighbert, of Huntington.

FOREIGN MINING NEWS

AUSTRALIA.

NEW SOUTH WALES.

Broken Hill Proprietary Company.—This company reports for the four weeks ending May 20 a total output from the refinery of 828 oz. gold, 400,712 oz. silver, 5,020 tons lead and 47 tons hard (antimonial) lead.

Gold Production.—The gold returns for March are 4,917 oz. fine, valued at £20,887; and for the first quarter of this year 32,748 oz. fine, valued at £139,106.

CANADA.

BRITISH COLUMBIA.

London & British Columbia Gold-fields, Limited.—A proposal for reorganization of this company on a 4s. a share assessment basis, it is said, will be made at the next general meeting. This action, it is said, is advisable in order to provide funds to meet the company's immediate liabilities, and to enable the directors to preserve the large number of shares held in the Whitewater, Ruth, Enterprise, Ymir and Kettle River companies. The Ymir and Kettle River stocks being claimed to have great prospective value.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Granby Consolidated.—The new 60-drill air compressor is in commission. It is furnishing power for drills in the Old Ironsides and Knob Hill mines, and later will drive the hoist. The smelter blew out one furnace recently, owing to a shortage of coke. A supply of 2,000 tons of coke is being shipped from Fairfax, Wash.

Morrison Mines, Limited.—This company, through Fred H. Oliver, managing director, has arranged with the Canadian Pacific Railway for the construction of a spur to the mine, about 6,200 ft. The company has also an agreement with the Montreal & Boston Copper Company, whereby the latter is to take the output of the mine, for the Boundary Falls Smelter, a minimum of 100 tons and a maximum of 200 tons daily.

Snowshoe.—A larger force is being put to work. The daily output is reported at 240 tons.

Waterloo Consolidated Company.—The treasurer's report, submitted at the recent annual meeting in Spokane, showed the company to be in a favorable condition financially. Denis Clark, manager, reported favorably on the mine and mill, which is being renovated. The old officers were all re-elected, except H. T. Jones, treasurer, who has removed from Spokane, and L. H. Snyder was substituted. The officers are: James F. Sloane, president; B. A. Merrick, vice-president; L. H. Snyder, treasurer; Denis Clark, manager; L. Roy Slater, secretary; trustees, Denis Clark, C. K. Merriam, Charles H. Wolf, Jas. F. Sloane, T. H. Graham, B. A. Merrick, L. H. Snyder.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Crow's Nest Pass Coal Company, Limited.—The present output is over 800 tons daily; about 600 men are employed. The output is to be increased to 1,000 tons. Between the coal mines and the new town of Morrissey Mines 250 coke ovens are being erected at a cost of $250,000.

BRITISH COLUMBIA—NELSON DISTRICT.

Trail Smelter.—Plans are completed for a new melting plant in connection with the electrolytic lead refinery. R. L. Whitehead, formerly manager of the Seattle refinery, will have charge of the refining plant.

BRITISH COLUMBIA—NORTHWEST KOOTENAY DISTRICT.

Horseshoe.—This property, on Trout Creek, has been turned over by Mr. Mayer to G. W. Stead, representing the purchaser, a Philadelphia syndicate, operating the Lucky Boy and Ethel.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

The shipments from Rossland camp for week ending May 23 were as follows: Le Roi, 3,220 tons; Center Star, 1,620; War Eagle, 1,020; Le Roi No. 2, 805; Velvet, 80; Kootenay, 150; total, 6,895; year to date, 143,365. Bad roads interfered with shipments.

Jumbo.—The construction of a tramway is underway from its No. 1 adit to the wagon road.

Le Roi No. 2.—Work on the foundations for the Elmore oil concentrator, started recently.

Nickel Plate.—This mine, belonging to the Rossland-Kootenay group is being unwatered. It has been quite a producer, but is now in litigation with the Center Star Mine.

Spitzee.—Construction commenced recently on new buildings for this mine. The main structure will be 24 by 82 ft. On its completion the company will install a 5-drill compressor and a hoisting plant capable of going to the 500-ft. level.

BRITISH COLUMBIA—SLOCAN DISTRICT.

Poole.—A tram 4,200 ft. long is being put in for this property in the Lardeau section by B. C. Riblet.

Silver Cup.—B. C. Riblet is putting in a wire tram 3 miles long to connect this mine in the Lardeau with the 125-ton concentrator. George Atwood, formerly manager for the Rio Tinto in Spain, is managing the property.

BRITISH COLUMBIA—VANCOUVER ISLAND.

The striking coal miners recently rejected the terms of settlement proposed by Mr. Dunsmuir. The terms, it is understood, required the abandonment of the Western Federation and a reduction of 10 per cent in wages. An attempt may be made to operate the mines shortly.

YUKON TERRITORY.

The spring clean-ups are now in progress. The yield from Gold Run, Dominion and Sulphur creeks will be larger than anticipated. A movement is under way to have the duty on American mining machinery, which Canadian manufacturers cannot furnish, suspended.

NOVA SCOTIA—CAPE BRETON.

Dominion Coal Company.—The output for May was 215,813 tons, a decrease of 12,065 tons from April, and 8,182 tons from May last year. The mines were worked only 24 days. Dominion No. 1 Mine is being unwatered at the rate of 4 ft. per day.

ONTARIO—ALGOMA DISTRICT.

Algoma & Calumet Development Company.—This concern has been organized with a capital of $40,000 in $10 shares to open a copper property in the Algoma District. Work is to start at once.

ONTARIO—HASTINGS COUNTY.

Canada Corundum Company.—The capacity of this company's 20-ton plant at Craignivet is to be increased to 200 tons per day. About 100 men are employed at present.

Ontario Mining and Smelting Company.—This new concern has taken hold of some of the mines north of Madoc, with office at Bannockburn. H. F. E. Gamm is superintendent.

MEXICO.

SONORA.

Cananea.—The Arizona Supreme Court heard at Phœnix recently arguments in the case of Axel W. Hallenberg, of New York, against W. C. Greene and others, involving possession of these mines. Hallenberg claims to be a stockholder and a creditor of the Cobre Grande Company, which, after four years' litigation with Greene, was settled by the officers of the Cobre Grande. Hallenberg asks for a reopening of the case, and the appointment of a receiver. The principal argument in his behalf was made by H. G. Atwater, of New York. J. Edward Addicks is an interpleader. A decision will be handed down in October.

MINING STOCKS.

(Full quotations are given on pages 881 and 882.)

New York June 2.

Underneath the surface there is something mysterious about the copper share market. Some interests attribute the heavy trading to the Standard Oil coterie; others, to the adverse speculation in the London metal market. Certainly some people of influence are behind the bear raid in the stock market, as the movement is almost identical to that of a year ago, when prices broke the low record. The fact that 232,550 shares of Amalgamated Copper—equivalent to over 16 per cent of its issued capital—changed hands in four days is suggestive. A drop of 5½ points to $55½—within $2.50 of the lowest on record for the stock—has also attracted attention. Simultaneously Anaconda sold 6,900 shares at a discount of 4½ points to 86¼ per cent ($21.56), which is only $1.56 above the low level of a year ago.

On curb the copper shares were uninteresting, brokers apparently not daring to venture any large trading for fear of a loss while prices on 'change are erratic. Tennessee sold at $29@$28¼; Greene Consolidated at $27¾; United, of Montana, $17, and British Columbia at $4.

Some improvement is shown in the Comstock stocks. Consolidated California & Virginia gained 15c. to $2; Ophir, 65c. to $2.10; Union Consolidated brought $1; Hale & Norcross, 74c.; and Gould & Curry, 52c. Silver Hill, also of Storey County, Nev., sold at $1.35.

In the Colorado gold list trading was small. Portland, of Cripple Creek, weakened to $1.33, while Elkton brought 40c.; C. K. & N., 18½c., and Isabella, 18c.

Boston. June 2.

(From Our Special Correspondent.)

Copper shareholders are discouraged at the turn of affairs, and are now looking forward to a dull and uninteresting market this summer. In fact, a great many would not be surprised if the price of the metal were to yield, thereby spoiling the remnant of a chance left for a better market. It is felt that the test must come soon in the character of buying by consumers who are running short of the metal.

The feature in the market has been the savage break in Dominion Coal and Dominion Iron and Steel, particularly the former. Dominion coal broke $25 per share to $70, with recovery to $78.50 to-night. Dominion Iron rallied to $20, but broke to $13, which is its previous low record. It recovered to $14.50. These declines did not affect the list as they were within themselves, and due to the failure of a large banking house in Toronto.

Copper shares have followed Amalgamated in the market, and nothing is expected from them until this stock gets into some settled condition. Amalgamated has fallen $5.50 to $55.37½. Copper Range has received support, although it fell to $55.50, recovering to $56.37½. Utah also had a $2.75 drop to $29.50, but seemed to meet with some resistance at that level.

Reports here are that certain Amalgamated officials did not approve of the booming tactics that have transpired in the stock and have been punishing the promoters of it, who were also instrumental in putting Utah Consolidated up. Arcadian made its low record at $2.50. Rock shipments have been discontinued at the Arcadian, although it is understood that sinking will be continued. Calumet & Hecla has lost $15 to $500, and Tamarack dropped $9 to $190. Quincy is off $2.50 to $103, although it was offered at $100 at one time. Osceola is off $4 to $59. Wolverine, $1.25 to $69; Parrot, $2.50 to $23; Mohawk, $2.25 to $45.25, and Centennial fell $3.50 to $19, recovering to $20. Atlantic has settled $1 to $9 and Trinity fell $1.50 to $6.50, recovering to $7.25; Winona fell $1.50 to $9.50, and Bingham $2[illegible] to $26.50. United States has varied from $2[illegible] 12½ to $21.75, and United States Coal and Oil has advanced to $13. Dividend payments on the latter are expected within a year.

The Quincy Mine's May output was 1,043 tons of mineral; Wolverine, 514 tons, which is its record; Franklin, 371; Atlantic, 326; Trimountain, 640; Mohawk, 379; Winona, 100; Champion, 691, and Baltic 60[illegible] tons of mineral. Calumet & Hecla produced 3,400 tons of fine copper during May; Osceola, 610 tons; M[illegible], 12½ Adventure, 142, and Isle Royale, 105 tons.

Daly West sold at from $47 to $45. Extra dividends may be paid this summer. About 25 per cent of the stock is owned in New England, 25 per cent in Cincinnati, and 50 per cent in Salt Lake.

San Francisco. May 30.

(From Our Special Correspondent.)

Business in the Comstocks was somewhat better. Prices are firmer, and some gains are reported. Caledonia sold at $1.25; Consolidated California & Virginia, $1.15@$1.20; Sierra Nevada, 65c.; Gould & Curry, 42c.

On the new San Francisco & Tonopah Exchange business was active. There were many buyers, and prices were well sustained. Tonopah Belmont sold at $2.25; Tonopah Union, $1.55; Montana Tonopah, $1.15@$1.20; Colehan, 30c.; Gold Mountain, 29c.; Gipsy Queen, 27c.; Lucky Tom, 18@20c.; Rescue, 22c.

On the Oil Exchange business was fair and prices steady. Thirty-three was quoted at $8; San Joaquin, $6.25; Home, $2.60; Monte Cristo, $1.10. The tendency this week was in favor of the higher-priced stocks.

COAL TRADE REVIEW.

New York, June 4.

ANTHRACITE.

The anthracite trade shows no change in the activity that has prevailed since April 1. Demand is widespread, and is taking the full output of the collieries, that is, all that the miners are willing to get out. A lot of orders for coal at May discounts will be filled at June figures. The estimated shipments for May are 5,500,000 tons.

The newspapers have had considerable to say about a possible strike of the miners growing out of a dispute between the operators and the district presidents of the United Mine Workers as to the make-up of the Conciliation Committee. The award of the Strike Commission stated plainly that if an organization in each of the three anthracite districts represents a majority of the mine workers in such district, one member of the Conciliation Committee shall be appointed by each organization. It is scarcely likely that there will be a strike over the interpretation of a clause so plainly worded, though it is altogether likely that the district presidents are far from astisfied with the awards of the Commission and some of the more hot-headed of the local officers may talk strike.

In Lake Superior territory receipts of anthracite are very light, considering the demand, receipts for May showing a falling off compared with April figures. There is little chance for anthracite to accumulate on docks, owing to the desire of country yards to put in supplies. In Chicago territory also, Lake receipts do not meet the demand. Coal wanted at May discounts will be taken at June or even July prices, since the demand is apparently widespread enough to ensure activity until August, anyway. There is considerable complaint of vessels arriving loaded with several sizes, and dealers who are short of any size find trouble in getting an adequate supply of that size. Along the lower lakes and in Canadian territory business continues good. At seaboard points dealers continue to give attention to anthracite in preference to bituminous, and receipts of the former are altogether inadequate to meet demand. A lot of yards that want anthracite have not been able to store any yet. Retail buying is still brisk at points beyond Cape Cod, continues of good volume at New York Harbor points, but at Philadelphia has fallen off a little.

The June prices for free-burning white ash coal, f.o.b. New York Harbor shipping ports, are: Broken, $4.45; egg, stove and chestnut, $4.70.

BITUMINOUS.

The Atlantic seaboard bituminous trade shows a slight improvement in prices, as short car supply at the mines has restricted tidewater receipts. Prices now range around $2.70@$2.75, f.o.b. New York Harbor shipping ports. Some coal has been offered for special purposes for less than these figures, and we hear of higher prices. The low quotations have put an end to the making of contracts for the current year, in fact, there is no talk about contracts at all.

Trade in the far East is not brisk, though the most orders, comparatively, come from that territory. Along Long Island Sound trade is quiet. There is much complaint of poor unloading facilities provided by the New York, New Haven & Hartford Railroad, and of demurrage accruing on boats in consequence. There is even complaint that preferences in unloading are given. At New York Harbor points trade is quiet, but the ordinary tonnage of coal is moving. The all-rail trade is taking about 50 per cent of what it usually takes.

Car supply at the mines varies from 50 to 75 per cent of the demand. Transportation from mines to tidewater is fairly prompt, coal coming through in less than a week. In the coastwise vessel market vessels, though still scarce, are in slightly better supply than they have been. We quote current rates from Philadelphia as follows: Providence, New Bedford and Long Island Sound, 75@80c.; Boston and Salem, 95c.@$1; Portland, Portsmouth and Bath, $1; Lynn, $1.15; Newburyport and Bangor, $1.25; Saco and Gardiner, $1.25 and towages. Rates from the farther lower ports are 10c. higher than above.

Birmingham. June 1.

(From Our Special Correspondent.)

The production of coal in Alabama is very active. At almost every mine in the State there is a large production and the same is being handled steadily by the railroads. The supply of empty cars with which to handle the product of the mines is quite adequate. Good prices prevail for coal. There is not much going to the bins, and but little apprehension as yet that there is likely to be a shut-down after July 1.

The development in the coal-field continues brisk. The Collins Coal Company, with $50,000 capital stock, was organized during the past week, the object being to mine and sell coal. The preparations are being pushed for a larger coal production by next fall in this State. Railroad construction in this State is being rushed also, with the object in view of finishing before the fall weather sets in.

Chicago. June 1.

(From Our Special Correspondent.)

For the season of the year, the wholesale trade in coal is very satisfactory to dealers. Anthracite business is heavy, and many users of bituminous are accumulating stocks in good season against the winter, six months hence. The end of May, like the end of April, saw a heavy rush of buyers of anthracite, to take advantage of the May car price, $6.10 against $6.20, the June rate.

Both city and country trade in anthracite is very satisfactory to dealers. The public apparently will run no risk of another anthracite famine in winter, if buying ahead can avert the evil. The normal supply of anthracite is not coming in, although lake shipments are heavy. It is estimated to be 10 to 20 per cent short by different dealers. As usual, after the opening of navigation, comparatively little anthracite is coming by rail.

In the bituminous market the most significant feature seems to be the slackening in demand for smokeless. "They have boosted the price too high," is the common explanation of this change. Western coals have declined in price, Illinois and Indiana lump, nut and egg being to-day quoted at $2, against $2.50 a month ago. Light demand is the cause. Smokeless is still at $3.75 for Pocahontas, New River or Maryland. For Hocking the market continues steady and the price $3.50. Youghiogheny is in somewhat better demand at $3.65. Stocks of bituminous as well as of anthracite are being accumulated by prudently inclined users.

The prevalent labor troubles in nearly every industry appear little likely to reach the coal trade. Under the five-years' contract with the coal teamsters union, which has yet four years to run, employers and employed are working on a harmonious basis, and there are no signs of trouble from any other class of labor.

Cleveland. June 2.

(From Our Special Correspondent.)

The coal situation in this territory has been firm and strong. The coke supply has been altogether adequate for the furnaces in the valleys and at Cleveland and the movement has been free. The factories have also been getting their share and more. These prices have been inclined to ease off because the railroad movement has been better than for months, and the increase in the facilities for delivering the material has eased up the vigorous demand at the ovens. The price of coal is also inclined downward, because the summer season naturally shows a decline in the demand for domestic coal. The railroad movement has helped this situation likewise. The lake trade might have been improved. That inexplicable shortage of cars has continued and the outlook is that the lake trade will be hampered by it through the better part of the summer. During the holidays the collection of coal cars at the lake ports was considerable, and for a while the boats were able to get all the cargoes they wanted. This is merely temporary, however. The lake docks have been congested for three days, and will continue so for the remainder of the week. The rates have remained stable on the lake coal situation, regardless of the hammering of the freights in the ore trade. The same conditions which warranted the ore shippers in breaking the rate, however, also presented itself in the coal trade and offered an opportunity for the coal shippers, but they did not avail themselves of it. The movement is brisk and the rates are firm. The prices of coal are still based on $2.45 for Pittsburg and West Virginia lump and $2.35 for Ohio lump.

Pittsburg. June 2.

(From Our Special Correspondent.)

Coal.—There is but little change in the situation. All the mines in the district are in full operation, which is usual for the first three days in the week. In the last two or three days there is a shortage of railroad cars. More coal is going to lake ports than in former years, and the local demand continues heavy. There is no change in prices. The Monongahela River Consolidated Coal and Coke Company took advantage of a slight rise in the rivers during the

week, and sent over 1,000,000 bush. of coal to the lower markets.

Connellsville Coke.—The supply of coke is good and shipments during the week were entirely satisfactory. Prices are easier and furnace coke can be had at $3@$3.50, and foundry at $4.50@$4.75. The *Courier*, in its last report, gives the production for the previous week in the Connellsville region at 250,800 tons, a falling off of nearly 1,000 tons. The shipments for the week were 11,558 cars, distributed as follows: To Pittsburg and river tipples, 4,205 cars; to points west of Pittsburg, 5,852 cars; to points east of Connellsville, 1,501 cars.

San Francisco. May 30.

(*From Our Special Correspondent.*)

Trade has been quiet, with about the usual arrivals. Stocks are good, except in Eastern coals.

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington and New Wellington, $8; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coals in car-load lots are quoted at $14 for Colorado anthracite, and $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal in cargo lots is at present nominal, but quotations are $14 for Pennsylvania anthracite a nd $13 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13; cannel, $8.50; Brymbo, $7.50; Wallsend, $7.50.

Foreign Coal Trade. June 4.

Exports of coal and coke from the United States for the four months ending April 30 are reported as follows by the Bureau of Statistics of the Treasury Department:

	1902.	1903.	Changes.
Anthracite	441,000	597,051	I. 156,051
Bituminous	1,661,936	1,549,581	D. 112,355
Total coal	2,102,936	2,146,632	I. 43,696
Coke	131,337	129,062	D. 2,275
Total	2,234,273	2,275,694	I. 41,421

The coke exports were chiefly to Mexico. The distribution of the coal exported was as follows:

	1902.	1903.	Changes.
Canada	1,402,646	1,574,293	I. 171,647
Mexico	180,258	245,422	I. 65,164
Cuba	155,706	160,240	I. 4,534
Other West Indies	135,164	83,198	D. 51,966
European countries	115,110	18,661	D. 96,449
Other countries	114,052	64,818	D. 49,234
Total	2,102,936	2,146,632	I. 43,696

The exports to Europe, it will be noted, have fallen this year to a very small quantity. This is due to the fact that there has been no surplus to spare for foreign trade.

Imports of coal into the United States for the four months ending April 30, are reported as follows:

	1902.	1903.	Changes.
Canada	570,203	734,006	I. 163,803
Mexico	2,243	5	D. 2,238
Great Britain	38,441	1,162,745	I. 1,124,304
Other Europe	668	356	D. 312
Japan	176	5,314	I. 5,138
Australia	104,769	57,115	D. 47,654
Other countries	274	1,019	I. 745
Total	716,774	1,960,600	I. 1,243,786

Of the coal imported from Great Britain this year 174,722 tons were classed as anthracite. All the rest of the coal imported was bituminous. The increase in imports this year was wholly at Atlantic ports.

Messrs. Hull, Blyth & Co., of Cardiff and London, report, under date of May 23, that the Welsh coal market maintains a firm and buoyant tone, and prices both for prompt and later delivery are very firm. Quotations are: Best Welsh steam coal, $3.78@$3.90; seconds, $3.66; thirds, $3.48; dry coals, $3.36; best Monmouthshire, $3.36@$3.48; seconds, $3.30; best small steam coal, $2.22; seconds, $2.10; other sorts, $1.92.

The above prices for Cardiff coal are all f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The freight market remains quiet, and rates are about unaltered. Some rates quoted from Cardiff are: Marseilles, $1.50; Genoa, $1.38; Naples, $1.32; Singapore, $2.46; Las Palmas, $1.44; St. Vincent, $1.56; Rio Janeiro, $2.04; Santos, $2.40; Buenos Aires, $1.68.

IRON TRADE REVIEW.

New York, June 4.

The iron trade continues in a somewhat hesitating position. Mills and furnaces are very fully occupied in dealing with contracts, but very little new business is coming in. Large interests are rather holding back with the expectation of some reduction in prices. The purchases of bessemer pig made by the United States Steel Corporation, as noted in our columns last week, have tended to fix the price of that grade. Furnaces, however, hesitate about giving concessions to outside buyers, claiming that the Corporation contract includes concessions on Connelsville coke which are equivalent to about 50c. a ton on the price of iron. The action of the Southern furnace, in reducing the base price $1.50 per ton, is likely to have a further effect on the market, and to strengthen the determination of the purchasers to hold off for a while.

Probably to counteract this tendency, some of the large interests have announced this week that they will have no steel billets for sale to outside parties for the balance of the year. This has had a slight effect in making prices firmer, but has not hastened buying. Meantime, German basic steel billets are being offered quite freely at some concessions for recent prices.

In finished material there is a lull in structural steel, builders not taking material ordered. There is considerable demand for girder rails. Bars and sheets are rather quiet, and there is more activity in plates.

Birmingham. June 1.

(*From Our Special Correspondent.*)

The statement that iron has been sold in this territory at $15.50 for No. 2 foundry, by any one, is stoutly denied in this district, it being claimed that no one has been selling at that price. The sales for the last half of the year do not aggregate a great amount of iron. The furnacemen here, though, are confident that buying will start up again in the near future, and everything will soon be in shape.

A prominent iron man seen during the past week was questioned concerning the iron market in this section, and he gave out the following statement: "It must be admitted that the market is yet quiet. Consumers are still waiting for a reduction. On the other hand, the furnacemen are holding up prices, and there are no indications of a reduction in the very near future. The future looks bright for the manufacturers. There is bound to be an improvement in the demand, and the fact that the larger consumers are buying now, even at a price under that quoted, is to be taken as encouragement. The production in this State is being held up, the accumulation so far being light yet. However, there is no apprehension that an alarming accumulation is going to occur."

The following quotations (West) are still given in this district: No. 1 foundry, $18@$19; No. 2 foundry, $17.50; No. 3 foundry, $16.50@$17; No. 4 foundry, $16; gray forge, $15.50@$16; No. 1 soft, $18@$19; No. 2 soft, $17.50.

The Southern Furnace Association will meet tomorrow to discuss prices, and it is probable that a reduction will be made.

Nothing definite yet is given out concerning new furnaces in the immediate Birmingham District concerning which in the last four or five weeks there has been so much talk heard hereabouts. The Republic Iron and Steel Company is contemplating some large improvements in this district, and W. H. Hassinger, vice-president and general manager of the Southern District for that concern, has been to Chicago, the general offices, conferring with the higher officials of the company, and inspecting works in other portions of the country. If rumors are true, this company will expend a million dollars in this district in the next year or two. Already great improvements are being made about the furnace plant at Thomas.

Foundries and machine shops are doing quite well for this season of the year in the Birmingham District. Some nice little contracts, all aggregating well, have been received by the different smaller institutions hereabouts recently.

BY TELEGRAPH.

Birmingham, Ala., June 2.—It is announced to-day that the large furnace interests of the South have made the price for No. 3 foundry for future delivery $14.50 Birmingham. This is a reduction of $1.50 per ton; No. 2 has heretofore been the basis of prices.

Chicago. June 1.

(*From Our Special Correspondent.*)

The pig iron market continues to be dull. There are few sales of magnitude, nearly all business being of the short-order kind—small lots and prompt delivery. Everybody buying wants his iron the day after the order is placed, but is unwilling to pay the premiums of $2 to $5 that prevailed on quick-delivery orders five to six months ago. Consequently, the buyer is making the market; sellers are doing little effective work toward creating something more like a normal tone. The attitude of the seller is largely a waiting attitude. He feels that things must come his way if he only waits long enough, and does not give way to the tendency usual at such times, to cut prices desperately in the hope of business.

Yet prices are being cut. How much no one in the trade will say with any assurance of accuracy. Nominally No. 2 Southern is selling at $19.85@$20.35. Practically, sales are known to have been made at $19.35, and a less figure is probable on a few contracts. If the stagnant condition of the last month continues it seems certain that prices will go at least $1 lower than the $19.85 mark—which represents $15.50, Birmingham, by the end of June. These prices are for the last half of the year. On quick deliveries there is a premium of 50c. to $1.

Northern is quoted at $21@$21.50 for No. 2, but there is little being sold. Users of iron seem to be figuring that Southern is the only material to be had in any quantity on speedy deliveries, which is undoubtedly the case. The customary difference of 50c. above or below the quotations for No. 2 iron, for No. 1 and No. 3, respectively, apply to the foregoing figures.

As yet there seems little effect from the large purchase of bessemer by the United States Steel Corporation. Local agents are hopeful that it may advance prices or at least check the impending decline, but express little positive confidence in its doing so.

Coke is abundant. Any reasonable quantity can be had promptly at $6.65@$7, with $6.75 probably representing what is being paid for most of the good foundry supply.

Cleveland. June 2.

(*From Our Special Correspondent.*)

Iron Ore.—The Steel Corporation during the past week forced the reduction of the Lake Superior and the Lake Michigan wild rates on ore by 5c. a ton, bringing the Duluth rate to 80c. and the Escanaba rate to 60c. The delay to boats has been considerable, and the movement to the furnaces direct has been slow. Otherwise the market has been unchanged. Some further talk of ore sales has been heard, but nothing developed. The prices have not changed, being based on $4.50 for bessemer old range and $4 for bessemer Mesabi.

Pig Iron.—The situation is dull, after the activity in bessemer a week ago. The foundry market was brisk for a short time after that sale, and then eased off again and without any sales to date for second half delivery, except some Southern iron that is sold in this territory by the non-association furnaces of the Birmingham District. The buying for first half delivery has been limited by the supply from the outside furnaces. The price on June delivery has been $22, Southern Ohio furnace. Some reports have been abroad of sales of bessemer for second half delivery at $19@$19.35, Valley furnace, and it is understood that these sales have been by the outside furnaces, the Bessemer Association not participating. Many of the basic furnaces are also reported sold up for the second half, and the price said to have been obtained on recent sales is $18.75, Valley furnace. The furnaces in this territory have not yet fully caught up on old orders held over from last year, and will not be even for fully another month, if not on into the third quarter of the year. In all lines of iron the production has been heavy, as the supply of coke has been adequate, and as there have been no other questions or things to disturb the progress of the stacks. Basic is off the market for the present.

Finished Material.—The sheet trade continues to be the strong feature of the market. The buying has been heavy, and the order books are now more than comfortably filled. Most transactions here are out of stock with a few mill sales. The prices are based on 3.10@3.25c. for No. 27 black sheets, out of stock. Some inquiries have been made for rails, but the demand has not been brisk enough as yet to amount to any business. The mills are hardly in any position to take on any new tonnage at this time. The steel trade is generally dull, but rails show a diversion. The prices hold at $28, Pittsburg, for standard, and $36, Pittsburg, for light rails. Plates are much easier. The specifications on old contracts have been slow, and although new orders are coming in the large mills are offering deliveries on new orders anywhere from two weeks to three months ,according to the specifications. The smaller mills are not getting much business, but what there is of it is done at a less price, the new basis being 1.90@1.95c., Cleveland. Structural steel is in less demand than it has been, and the market is easy. Some new business is showing up, but not much, the difficulty being to keep big projects moving because of the labor difficulties. The smaller mills are taking their chances with the larger ones in the open field and premiums are impossible because of the competition. The jobbers are getting a little business at the old prices of 2.15@2.25c. Bars are weak and prices are unchanged at 1.60c. for bessemer steel, and 1.75c., Cleveland, to 1.80c., Youngstown, for bar iron. Specifications on all contracts excepting rails have been light.

Philadelphia. June 4.

(*From Our Special Correspondent.*)

Pig Iron.—The market continues quiet in all lines as measured by sales. Greater interest is felt than last week in view of the large sales in Western Pennsylvania, and in view of the action taken in

Northern Alabama. Our brokers and representatives claim the market is stronger all along the line than a week ago, but they have no outward proof for their confidence. Without theorizing on the matter, it is evident that conditions are gradually shaping up for a more active demand, because of the sparcity of stocks in consumers' hands and the heavy consumptive requirements apearing in sight. The view held by a good many buyers is that the margin of profit allows low quotations, and that the momentum that has already gathered is strong enough to carry prices lower. Buyers are not showing any anxiety to order far ahead, and have confidence that market conditions are making in their favor. There are large quantities of iron to be had, and this is the weakest feature in the whole situation. Quotations are one thing and bottom prices at which business can be done are another. Fair quotations may be given at $21 for No. 1X foundry; $20 for No. 2X; $19 for No. 2 plain; $19@$19.50 for gray forge; ordinary gray forge grades are to be had at $18.50.

There is nothing to report in foreign irons, apart from arrivals under old contracts. Basic is quoted at $19 to-day, as well as Middlesboro No. 3 at retail. At wholesale English No. 3 is offered as low as $16.75.

Billets.—The undertone of the market is very strong, owing to the fact that makers have call for more production than they are able to promise. Open-hearth in large lots is $30.50, but the only business done in any direction is in small lots.

Bars.—Competition has again broken out in bars, especially in common iron, because large quantities are wanted and mill owners are anxious to capture this sort of business. Further weakness is probable in view of the shopping around that we hear of. Refined iron is quoted in car lots at 1.85c.; steel bars, 1.70c.

Sheets.—This branch of the trade is very active, and if prices are shaded to any extent the fact is kept quiet. The card rate, 3c. on No. 28, is pretty firmly adhered to.

Skelp.—Skelp continues strong and active, and a good week's business has been done. Prices may be shaded by reason of some sharp bidding now going on between Eastern and Western mills.

Pipes and Tubes.—The recent failure has not produced any discernable effects. More or less disappointment is frequently expressed over the failure of mills to deliver stuff according to contract.

Merchant Steel.—There is no shading on business done in this market despite rumors to the contrary. Our people are nt just at present inclined to buy in a large way. The Eastern and Middle States are absorbing even larger quantities of merchant steel than earlier in the spring, but there is less concern to order ahead.

Nails.—Nails are quite active throughout this territory, and factories are busy.

Plates.—Some little anxiety is indicated among manufacturers in quotations, which were made yesterday on specifications for large lots. In a small way prices are very firm, and no weakness is probable, but the large interests have decided that prices must weaken, and are acting accordingly. Small lots of quarter-inch sold to-day at 2c.; large lots sold down to 1.70c.; universals, 1.80c.; flange, 2c.; marine, 2.16c.; firebox, 2.20c.

Structural Material.—There are prompter deliveries just now, as certain building requirements are not calling for promised deliveries. The belief prevails among the smaller buyers that a sweeping cut in shapes is bound to come. Beams, angles and channels are 1.73½@1.80c.

Steel Rails.—Girder rails are engaging attention of mills at present, and a good business for early autumn delivery is now shaping up. Electric line work is becoming a quite important feature. A good many special orders have to be dealt with.

Old Rails.—Old iron rails are about $25, nominally at least, and steel rails are wanted at $21.

Scrap.—Sales in scrap are unimportant this week, but dealers assert there is no weakness in those kinds of scrap, for which there is the most urgent demand. Some phosphorus scrap is held as high as $29. Heavy steel scrap is called for at $20, but there is none offering at that price. Country scrap is selling occasionally at $19@$19.50.

Pittsburg. June 2.

(*From Our Special Correspondent.*)

The purchase of pig iron by the United States Steel Corporation for delivery this month and in the third quarter has greatly stimulated the iron and steel market, and has established bottom prices for the rest of the year. It is doubtful if the low rate paid for bessemer pig iron will be duplicated even later in the year. The Corporation was in the market for 240,000 tons, but was unable to agree with the furnaces on a satisfactory price for the entire amount, and so far only 100,000 tons have been purchased. The purchase by the Corporation was revised after the preliminary arrangements were made early last week, but the price is the same as announced, $19, for June—July delivery, and $18.50 for third quarter. The Bessemer Furnace Association will supply 43,000 tons for third quarter, and W. P. Snyder & Co., 30,000 tons in addition to 10,000 tons for June—July delivery. Rogers, Brown & Co. will deliver 17,000 tons in the third quarter. The price for this iron has not been made public, but it is not lower. One of the association furnaces, it is understood, withdrew its allotment on account of the price. The low rate was made in order to guarantee coke delivery throughout the year at the Corporation's official price of $3 a ton at the ovens. An unusual number of inquiries have been received since the big sale was announced, but there is a hitch as to price. All want the advantage of the rate secured by the Corporation, but the lowest price offered is fully 50c. a ton higher. The Valley furnaces are practically sold up to October 1, and a number have gone out of blast during the week for repairs. Sales to steel works that are short of iron amount to over 10,000 tons and negotiations are pending for fourth quarter iron. Foundry and forge iron are not active, as furnaces have not reduced the price and buyers are waiting. A meeting of the Southern furnace interests is scheduled for this week at which a new arrangement of prices will be discussed. The official price announced on April 1 has not been maintained. The importation of pig iron in April was 100,000 tons, and in March 60,000 tons were brought to this country. The strength of the market is shown in the fact that this heavy importation was taken without any serious break in the ruling prices. It is believed here that pig iron for the last quarter will bring a higher figure than was fixed for third quarter delivery.

The market in finished lines is in better shape than it has been for some time. All the mills are busy, and some are behind in deliveries. According to a statement from a leading official the United States Steel Corporation is sold up for the rest of the year. Other large interests are not able to take on much new business. The Ohio steel plant at Youngstown was changed on Sunday night from billets to steel rails, and the scarcity of billets is likely to become more pronounced. The absurdity of the reported cuts in prices of crude steel are apparent when it is known that the large steel works are not selling any crude steel at all. Specifications on contracts in finished lines are being made steadily, and new business in some lines is being booked. While the official price remains unchanged in steel plates, sheets and tin-plate all orders for prompt shipment are taken at a premium.

The iron wage scale was settled during the week at a conference between representatives of the Republic Iron and Steel Company, and the Amalgamated Association of Iron, Steel and Tin Workers, held in Detroit. Contrary to expectations the workers got a better scale than the one now in force. Under the present scale the puddling rate advances 12½c. a ton for each 0.1c. increase in the average selling price of bar iron after the price reaches 1.6c. From 1.3c. the advance is 25c. a ton. The new scale makes the advance 25c. a ton for every 0.1c. increase. The last examination of the sales sheets showed the average selling price for two months was 1.7c., when the puddling rate was $6.12½ a ton. If that average is continued the puddling price for July and August will be $6.25 a ton. This is not considered likely, as bar iron prices have been unusually high. The new scale will be of no advantage to the workers over the old one, unless bar iron prices remain at the present figure or advances. The conference on the sheet scale between committees of the Amalgamated Associated and the American Sheet Steel Company will open here to-morrow. There will be no change unless the company asks for a reduction, which is not probable. The workers are not making any demand for an advance. The price of sheets has not been above the base of the Amalgamated Association scale for several years. Wages remain unchanged unless the average sales of Nos. 26, 27 and 28 gauges go above 3c.

Pig Iron.—Sales of bessemer pig iron to outside steel interests during the week are estimated at 10,000 tons. The minimum price for third quarter iron is $19.25, Valley furnaces. It is figured out that the price of $18.50 at which iron was sold to the United States Steel Corporation is equivalent to $19, or higher, on account of the agreement on coke. Foundry and gray forge sales have been slow, and there seems to be no disposition on the part of the furnaces to cut prices. Foundry No. 2 is quoted at $20.75@$21, Pittsburg, and gray forge is held at $19.75@$20, Pittsburg.

Steel.—There is still a scarcity of billets and the price of bessemer billets remains firm at $31, and open-hearth at $31.50@$32, delivered at Pittsburg. A few sales of small lots have been made during the week at these prices. The plate market is stronger than it was a week ago, but steel bars are a trifle easier. The official price remains at 1.60c.

Sheets.—Stocks are low and deliveries are not up to requirements, and as a result premiums on small lots are higher. There is no change in the official price, the leading producer continuing to quote No. 28 gauge black sheets at 2.75c., and galvanized at 3.85c.

Ferro-manganese.—The market is unchanged. Foreign ferro is still selling at $50@$52.50.

St. Louis. June 1.

(*From Our Special Correspondent.*)

Pig Iron.—There has been practically no market during the past week, sales being restricted to car-lots. This is true of the entire Valley and Southwest, where the consumers are still out of the market. Local iron users have been hurt by labor troubles. In consequence prices have a downward tendency, offerings being made as low as $15.50 for No. 2, Birmingham base. Stocks are so low that consumers will be compelled to make purchases before the end of the month.

Finished Material.—Prices and business in all lines of finished material are holding well. Jobbers are getting old prices for bars, 2.15c. for round lots, and 2.25c. for smaller orders. There is a good business in railroad and track supplies, and the smaller grades of structural material. Exasperating labor troubles have interfered with shipments to some extent.

Old Material.—Mills are not in the market for any amount of old material, and the railroads are making freer offerings; in consequence the market is weak. Steel scrap holds its price well.

New York. June 4.

Pig Iron.—The local market continues dull, with few transactions of importance. We quote for early delivery, Northern iron at tidewater: No. 1X foundry, $20.50; No. 2X, $19.50; No. 2 plain, $19. For Southern iron on dock, New York: No. 1 foundry, $20; No. 2, $19.50; No. 3, $19.

Bar Iron and Steel.—We quote for large lots on dock: Refined bars, 1.85@1.95c.; soft steel bars, 1.80@1.90c.

Plates.—The market locally is in good shape. Sheared plates are quoted: Tank, ¼-in. and heavier, at 1.85@2c.; flange, 2@2.05c.; marine, 2.10@2.20c.

Steel Rails.—The quotation remains $28 for standard sections, f.o.b. mills for 1903 delivery; light rails, $33@$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections.

Structural Material.—Some large sales have been made. We quote for large lots at tidewater: Beams, angles, channels and tees, 1.75@2c.

Cartagena, Spain. May 16.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—During the week tne shipments were three cargoes, 10,800 tons dry ore, to Great Britain, and one cargo, 4,000 tons dry ore, to Rotterdam; a total of 14,800 tons.

While the tone of the market continues strong and the demand for all kinds of ore is steady, the past week has been a very gloomy one, owing to the strike of the dock laborers. This was to a certain extent settled, and work was resumed on the 13th, but on the 15th the men employed in the discharge of the railway wagons came out on strike, the result being that most of the ships have to stop loading for want of ore. Under these unsettled circumstances local business is very depressed, and we can only hope that we may be able to report next week some satisfactory basis of settlement has been arrived at.

Prices are firm at 6s. 9d.@7s. per ton, f.o.b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 10s. 6d. per ton. Shipments reported for the week were 220 tons to Genoa.

CHEMICALS AND MINERALS.

(See also Prices-Current, page 884.)

New York, June 2.

Industrial inactivity, consequent upon the labor troubles in the building trades, is having a depressing effect on manufacturers of pigments and similar products. True, this is usually the quiet season, but it is discouraging to be obliged to cancel deliveries on regular contracts. New business is very scarce, notwithstanding the willingness of sellers to shade prices.

As predicted in this column weeks ago the asphalt combinations have taken on a new lease of life under reorganization as the General Asphalt Company. Of course, more capital is required, and the stock-

bolders are asked to contribute. Apparently the promoters are determined to have an asphalt combination, but so far their efforts have been unsatisfactory. So long as stockholders furnish the funds the scheme will be pushed, but there is evidently a misconception of the true management of a huge consolidation, otherwise two reorganizations would not have been necessary.

Imports of chemicals and minerals into the United States in April and the four months this year were as follows, in pounds, unless otherwise specified:

	April.	Jan.-April.
Chlorate of potash	78,396	191,023
Muriate of potash	9,140,268	32,529,724
Saltpeter	1,183,994	4,325,506
All other potash	3,644,818	20,038,952
Caustic soda	193,567	981,447
Sal soda	436,900	1,270,483
Soda ash	1,725,503	8,196,106
All other than nitrate of soda	1,838,986	7,154,741
Asphalt (tons)	6,817	30,504
Cement	87,196,487	306,875,451
Graphite (tons)	1,791	6,112
Salt	19,458,980	97,307,945

Compared with the corresponding four months last year there is an increase in cement, saltpeter and muriate of potash; the other substances showing a decrease, principally in the heavy chemicals.

Copperas.—Manufacturers have advanced prices to a basis of 47½c. per 100 lbs. for bulk, and 52½c. for barrels, f.o.b. New York. Demand is good, and production is increasing. The new Rockdale, Ill., plant of the American Steel and Wire Company is operating steadily. Last year the United States Steel Corporation, which controls this company, had a production of 14,224 tons.

Cyanide of Potassium.—Demand is small, either for domestic consumption or export. Recently 45 tons of cyanide were shipped from Liverpool, England, to New Orleans, at an average f.o.b. price of 21.7c. per lb. Importers at New York quote on the basis of 20c. per lb.

Bleaching Powder and Chlorine.—Not in a long while has the industry been so demoralized as in the current year, and it needs no prophet to say that manufacturers' books will show little or no profit at the end of December. We dare say some plants will suffer a loss. Already several important European works are economizing, particularly as regards fuel for generating power. On the other hand, electrolytic bleach makers are increasing their business, as they can cut prices to a level where old process plants hesitate to make long time contracts. Just now good bleaching powder may be had at 75c.@$1.12½ per 100 lbs., for domestic, f.o.b. works, and $1@$1.20, f.o.b. New York, for foreign brands. Nearly 75 per cent of our imports are of British bleach, which, as noted below, show an increase as compared with last year. The imports into the United States from all countries in April amounted to 13,093,518 lbs., which was the largest quantity reported this year, and exceeds that for April, 1902. In the four months ending April 30 the imports have been as follows, in pounds:

From:	1902.	1903.	Changes.
Great Britain	28,737,072	32,302,144	I. 3,564,072
Ger., Bel., France	15,401,344	11,068,951	D. 4,333,283
Total imports	44,138,416	43,37[illegible]	D. 768,221
Re-exports	112,471	6[illegible]	D. 45,511
Balance	44,025,945	43,303,235	D. 722,710
Estimated chlorine content	15,409,081	15,156,132	D. 252,949

The average invoice value of these imports and the relative price of the chlorine content, were as follows, per 100 lbs.:

	1902.	1903.	Changes.
Bleaching powder	$1.33	$0.87	D. $0.46
Chlorine	3.79	2.48	D. 1.31

The falling off in values this year is equivalent to about 35 per cent. In other words, there has been a decrease of $209,465 in the total value of imports.

Liquid chlorine as imported from Germany continues unchanged at 30c. per lb., f.o.b. New York, while chlorine water is quoted at 10c.

Copper Sulphate.—Consumption is not as large as it was a year ago, nor has the export trade been as good, but better prices have been received. To-day blue vitriol can be had at $5@$5.12½ per 100 lbs., f.o.b. New York. These prices are for domestic delivery, while for export probably less will be taken. The exports from the United States in April were 982 long tons, which though it is the second smallest quantity this year, nevertheless shows the best average price—$107.13 per ton. In the four months this year the exports totaled 6,625 tons, valued at $92.76 per ton, which compares with 10,816 tons at $90.09 in the same period of 1902. It is interesting to add that while the American exports have fallen about 63 per cent, the British foreign trade has increased nearly 40 per cent. On the other hand, it is gratifying to note that the parity between American and British values has narrowed down, notwithstanding the preference that is shown in some markets for the British article. Our best trade is being done with Italy and Austria, where copper sulphate is used extensively as an insecticide for the vineyards.

Acids.—Exceptionally quiet. Seems likely deliveries will be small as long as the labor troubles in the East continue. Prices are nominally unchanged, as below, per 100 lbs., unless otherwise specified, for large lots in carboys or bulk (in tank cars, delivered in New York and vicinity.

Muriatic, 18°....	$1.50	Oxalic com'l...	$5.25@$5.50
Muriatic, 20°....	1.60	Sulphuric, 50°,	
Muriatic, 22°....	1.75	bulk, ton ...	13.50@14.50
Nitric, 36°.....	4.37½	Sulphuric, 60°.	1.05
Nitric, 38°.....	4.75	Sulphuric, 60°,	
Nitric, 40°.....	5.00	bulk, ton	18.00@20.00
Nitric, 42°.....	5.37½	Sulphuric, 66°,	1.20
		bulk, ton ...	21.00@23.00

Brimstone.—Best unmixed seconds on spot can be bought at $22.75 per ton, and for shipment at $22@$22.25. Best thirds are about $1 less. Very little is being done. The imports into the United States in April were 14,628 long tons, which is considerably less than was reported in the previous month. Since January 1 the imports have been 74,273 tons, which compares with 50,900 tons last year; showing an increase of 14,373 tons, or 24 per cent. The sulphite pulp industry is responsible for this growth.

Exports of brimstone from Sicily in April amounted to 59,011 long tons, as against 61,683 tons in March, and 58,346 tons in April, 1902. In the 4 months ending April 30, the shipments were:

Destination:	1902	1903	Changes.
France	24,621	31,766	I. 7,145
Italy	28,041	25,944	D. 2,097
Portugal	8,664	13,671	I. 5,007
United States and Canada	65,567	58,014	D. 7,553
Other countries	67,633	77,698	I. 10,065
Total, tons	194,526	207,093	I. 12,567

The increase this year is equivalent to 6.4 per cent. The exports to America have fallen off 11.5 per cent, owing to high prices and larger stocks in consumers' hands, as a result of last year's heavy receipts.

Stocks at seaports in Sicily on April 31 continue to grow, being 286,759 tons, as compared with 251,815 tons in 1902, and 171,935 tons in 1901. To dispose of present stocks would take over 5 months, in which time it would be necessary to curtail production greatly.

Pyrites.—Business is quiet. Prices unchanged.

In April the United States imported 39,379 long tons pyrites, principally from Spain. The receipts since January were as follows, in long tons:

	1902.	1903	Changes.
Pyrites	137,620	140,929	I. 3,309
Sulphur content	64,681	66,237	I. 1,556

The increase this year is equivalent to about 3 per cent.

The average value of the imports was as follows, per long ton:

	1902.	1903.	Changes.
Pyrites	$3.65	$3.77	I. $0.12
Sulphur content	7.75	8.03	I. .28

Notwithstanding this advance consumers are paying considerably less for their sulphur than they could buy crude brimstone.

We quote: Domestic pyrites, $5 per ton for lump ore, f.o.b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites, carrying from 46@52 per cent sulphur, are quoted at 11@12c. per unit for lump and 10@10½c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—This market continues very strong, and prices are the highest in a long while. Spot has advanced to $2.30 per 100 lbs., arrivals $2.15, and futures $2. The heavy consumption, and firmer ocean freight rates, have caused the advance.

Imports of nitrate of soda into the United States in April amounted to 27,384 tons, making a total of 90,689 tons since January 1, which compares with 47,804 tons in the corresponding period last year. The increase this year is equivalent to 42,885 tons, or nearly 90 per cent. This expansion has been due to the heavy demand from the fertilizer and powder trades.

Messrs. Mortimer & Wisner's monthly statement of nitrate of soda, dated New York, June 1, gives the following interesting statistics:

	1903. Tons.	1902. Tons.	1901. Tons.
Imported into Atlantic ports from W. Coast S. A. from Jan. 1, 1903, to date....	81,495	50,115	75,560
	81,495	50,115	75,560
Stock in store and afloat June 1, 1903, in New York	.....	205	4,567
Philadelphia	600	4,800	.....
Baltimore	.....	.....	1,067
To arrive, due Sept. 15, 1903	73,570	46,800	44,281
Visible supply to Sept. 15, 1903	74,170	51,805	49,915
Stock on hand Jan. 1, 1903	7,300	10,000	1,793
Deliveries, past month	12,025	11,461	17,577
Deliveries since Jan. 1	88,695	55,445	71,720
Total yearly deliveries	.....	179,613	175,176
Prices current, June 1	2⅛c.	2.10c.	1.85c.

Deliveries this year show an increase of 33,250 tons, or nearly 60 per cent.

Sulphate of Ammonia.—Gas liquor is worth $3.12½ per 100 lbs., f.o.b. New York for early shipment. Nothing special doing to attract attention.

Phosphates.—In some sections abroad superphosphate manufacturers are pretty well stocked, but in others pretensions are being made apparently to turn the views of the phosphate miners who are holding for higher prices. No apprehension is being felt by American producers, however, as they realize that the European superphosphate people depend on Florida and Tennessee for their high-grade phosphates. Consequently, exporters are not pushing sales, feeling they will gain more by waiting.

In mining centers, particularly in Florida, consolidation fever is widespread. The latest information is that the 30,000 acres owned by the Cummer people between High Springs and Newberry will likely pass into the control of the Dutton Phosphate Company. Simultaneously, it is said that the Dutton people are negotiating for the properties of two other large rock producers in Florida. How true these rumors are must be shown by developments, not by statements from parties who would be interested in consumating such deals. The Dutton Company was apparently unknown to many of the more prominent phosphate miners, until it acquired the Ford & Hiller plant.

Ocean freight rates are easier. Charters booked include Port Inglis, Florida, to London, England, at 13s. 6d. ($3.24), and to Antwerp, 13s. ($3.12); Brunswick, Ga., to Rotterdam, 11s. 9d. ($2.82); all sailing in June.

Exports of phosphates from the United States in April amounted to 95,321 tons, which is the second best month this year.

The shipments since January were approximately as follows, in long tons:

	1902.	1903.	Changes.
Florida	178,745	202,047	I. 23,302
Tennessee	35,802	34,144	D. 1,658
South Carolina	9,890	9,328	D. 562
Total	224,437	245,519	I. 21,082

The increase, this year, is equivalent to about 9 per cent, principally in Florida high-grade rock sent to Germany.

Imports of phosphates in April were 7,487 tons, making a total of 48,968 tons since January, which is considerably more than was reported last year.

Phosphates	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (77@80%).	$7.00@$7.50	7⅛@7⅝d.	$11.02@11.89
*Fla. land peb. (68@73%)..	3.50@ 3.75	5½@5¾d.	7.70@ 8.05
†Tenn., (78@82%) export.	3.75@ 4.00	6½@7d.	10.40@11.20
†Tenn., 78% domestic.....	3.50@ 3.75	.....	.....
†Tenn., 75% domestic.....	3.25	.....	.....
†Tenn., 73@74% domestic...	2.70@ 2.95	.....	.....
†Tenn., 70@72% domestic...	2.45@ 2.70	.....	.....
‡So. Car. land rock.....	....@ 3.25	.....	.....
‡S. Car. riv. r'k (55@60%)	2.75@ 3.00	5@5⅜d.	5.80@ 6.23
Algerian (63@70%)	.....	5⅜@6¼d.	7.09@ 8.02
Algerian (58@63%)	.....	5¼@6d.	6.15@ 7.26
Gafsa (Tunis)	.....	5¼@6d.	6.15@ 7.26
Christmas Isl. (80@85%)..	.....	7¼@7¾d.	12.04@12.87

* Fernandina, Tampa, Brunswick, Savannah or Port Inglis.
† Mt. Pleasant. ‡ On vessels, Ashley River.

Liverpool. May 20.

(Special Report of Joseph P. Brunner & Co.)

Trade is still quiet, while quotations are mostly without change.

Soda Ash is firm. For tierces, nearest value may be called about as follows: Leblanc ash, 48 per cent. £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags 5s. per ton under price for tierces.

Soda Crystals are in fair jobbing demand at generally £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special terms for certain favored markets.

Caustic Soda is quoted as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching Powder is very idle. Hardwood is nominally quoted at £3 5s.@£4 10s. per ton, as to market; but the difficulty is to find buyers.

Chlorate of Potash is dull at 2⅞@3d. per lb., for English makes.

Bicarb. Soda is steady at £6 15s. per ton, less 2½ per cent for the finest quality in 1-cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of Ammonia has gone off again, and £13@£13 5s. per ton, less 2½ per cent is about nearest value for good gray 24@25 per cent in double bags, f.o.b. here.

Nitrate of Soda is in moderate spot demand at £9 15s.@£10 per ton, less 2½ per cent for double bags, f.o.b. here, as to quality.

METAL MARKET.

New York, June 4.

Gold and Silver Exports and Imports.

At all United States Ports in April and Year.

Metal	April. 1902.	April. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports....	$2,844,204	$1,705,516	$17,916,305	$4,331,627
Imports....	1,844,767	1,106,135	7,603,834	9,137,801
Excess.	E. $979,437	E. $599,381	E. $10,312,471	I. $4,806,174
Silver:				
Exports....	$3,740,777	$2,619,472	$15,492,683	$13,727,151
Imports....	2,051,251	1,616,067	8,471,074	6,676,810
Excess.	E. $1,689,526	E. $1,003,405	E. $7,021,589	E. $7,050,341

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending June 3, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week ...	$300,000	$58,052	$150,555	.....	E. $692,513
1903.....	8,495,823	2,948,928	7,709,560	$988,959	E. 12,817,516
1902.....	16,474 665	1,048,062	12 989,502	497,826	E. 27,868,329
1901.....	20,411.990	1,159,508	14,803.765	1,772,775	E. 32,283,522

The gold exported this week went chiefly to South America; the silver to London. The gold imports were principally from the West Indies and Central America.

Financial Notes of the Week.

General business has been almost stagnant, owing to the labor troubles and inactivity in certain important industrial centers. The dullness has been intensified by the approaching summer season, when vacations and other circumstances interrupt business. There have been further bookings of gold for export, and so far this week $3,000,000 has been reported.

The statement of the New York banks, including the 56 banks represented in the Clearing House, for the week ending May 29, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts .	$866,314,700	$885,592,600	$922,975,900
Deposits	952,398,200	948,326,400	913,081,800
Circulation	31,093,600	31,245,300	44,173,300
Specie	181,190,000	172,536,600	164,005,800
Legal tenders	78,162,600	76,474,000	73,909,800
Total reserve	$259,252,600	$249,010,600	$237,915,600
Legal requirements .	238,099,550	237,081,600	228,270,450
Balance surplus ...	$21,153,050	$11,929,000	$9,645,150

Changes for the week, this year, were increases of $2,036,600 in legal tenders and $422,425 in surplus reserve; decreases of $487,200 in loans and discounts, $50,700 in circulation, $1,529,300 in deposits, and $1,996,000 in specie.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd.	$172,536,600	.....	$164,005,800	.....
England ...	179,724,070	.....	179,248,130	.....
France	514,954,140	$223,963,415	500,253,090	$223,426,980
Germany ..	195,630,000	72,355,000	175,270,000	61,580,000
Spain	70,625,000	93,395,000	72,580,000	101,920,000
Neth'l'ds ..	24,367,000	33,920,000	19,700,000	32,822,000
Belgium ...	16,033.335	8,016,665	15,423,335	7,711,665
Italy	80,810,000	10,948,000	89,595,000	11,317,000
Russia	370,275,000	44,555,000	387,880,000	44,415,000

The returns of the Associated Banks of New York are of date May 29, and the others May 28, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has ruled steady without special feature. Our Government has continued to buy for Philippine coinage, but India has not been an active bidder.

The United States Assay Office in New York reports receipts of 61,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to May 21 are reported by Messrs. Pixley & Abell's circular, as follows:

	1902.	1903.	Changes.	
India	£3,049,725	£2,839.125	D.	£210,600
China	16,500	168,156	I.	151,656
The Straits	62,650	186,079	I.	123,429
Total	£3,128,875	£3,193,360	I.	£64,485

Receipts for the week were £98,000 in bar silver from New York, £3,000 from the West Indies, and £5,000 from Australia; also £27,000 in Mexican dollars from New York; total, £133,000. Shipments were £79,000 in bar silver to India, and £37,688 to China; total, £116,688.

Indian exchange has been steady, demand for money in India being a little better. The Council bills offered in London brought an average of 15.97d. per rupee. Buying of silver for India has been light.

The coinage executed at the mints of the United States in May and the 5 months this year is reported by the Bureau of the Mint, Treasury Department, as below:

Denominations:	May. Pieces.	May. Value.	Jan.-May. Value.
Double eagles	.....	.....	$11,206,680.00
Eagles	.....	.....	1,951,200.00
Half eagles	.....	.....	8,670,310.00
Quar. eagles	27,600	$69,000.00	206,640.00
Dollars for La. Exp..	.....	.....	175,178.00
Total gold	27,600	$69,000.00	$22,210,008.00
Dollars	528,000	528,000.00	5,332,325.00
Half dollars	76,000	38,000.00	1,174,548.50
Quar. dollars	2,608,000	652,000.00	1,038,081.25
Dimes	3,660,000	366,000.00	672,032.50
Total silver	6,872,000	$1,584,000.00	$8,216,987.25
Five c. nickels	1,575,000	78,750.00	665,600.00
One c. bronze	4,875,629	48,736.29	366,706.29
Total minor	6,450,629	$127.486.29	$1,032,306.29
Total coinage	13,348,229	$1,780,486.29	$31,459,301.54

The May coinage was much less than the previous month, chiefly in silver.

The coinage for the Philippine Islands was as follows:

Denomination:	April. Pieces.	May. Pieces.
Pesos	1,206,000	4,505,301
50-centavos	.....	600,313
20-centavos	.....	500,261
10-centavos	.....	1,000,521
Total	1,206,000	6,606,396

The total coinage in the two months amounts to 7,812,396 pieces.

Imports of gold and silver at San Francisco for the four months ending April 30 are reported as follows:

	Gold.	Silver.	Total.
Coin	$19,700	$306	$20,006
Bullion	311,719	537,807	849,526
Totals	$331,419	$538,113	$869,532

Imports this year have been light. Exports of gold and silver for the same period are reported as follows:

	Gold.	Silver.	Total.
Coin	$17,734	$324,633	$342,367
Bullion	.....	533,400	533,400
Totals	$17,734	$858,033	$875,767

Exports also were very light, especially those of silver. The silver coin was chiefly Mexican dollars.

The Treasury Department's estimate of the amount and kinds of money in the United States on June 1 is as follows:

	Total.	In treas.	In circ't'n.
Gold coin (inc. bul. in Treas.	$1,261,445,124	$256,208,626	$623,982,009
Gold certificates	.....	.....	381,254,489
Silver dollars	552,876,093	22,872,153	73,417.209
Silver certificates ...	.....	.....	456,586.731
Subsid. silver	101,503,440	9,636,251	91,867.189
Treas. notes of 1890.	20,013,000	146,258	19,866,742
U. S. notes	346,681,016	6,571,478	340,109,538
Nat. bank notes	406,443,205	11,352,287	395,090,918
Total	$2,688,961,878	$306,787,053	$2,382,174,825

Population of the United States June 1, 1903, estimated at 80,372,000; circulation per capita, $29.64. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the Treasury as assets of the Government does not include deposits of public money in National Bank Depositaries, to the credit of the Treasurer of the United States, and amounting to $142,962,738. The amount in circulation shows an increase of $7,821,105 over May 1; and an increase of $127,758,850, as compared with June 1, 1902.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	$0.43	$0.45
Peruvian soles and Chilean pesos	.39	.42
Victoria sovereigns.....	4.85	4 88
Twenty francs.....	3.86	4 88
Twenty marks.....	4.74	3.80
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

May June	Sterling Exchange	Silver— N. Y. Cts.	Copper— London, Pence.	Copper— Lake, Cts. per lb.	Copper— Electrolytic, Cts. per lb.	Copper— London, £ per ton.	Tin, Cts per lb.	Spelter— Lead Cts. per lb.	Spelter— N. Y. Cts. per lb.	Spelter— S. L., Cts per lb.
				14¼	14			4.30	5.65	5.50
28	4.87⅞	53	24 7/16	@14½	@14½	58¼	28½	@4.35	@5.70	@5.55
				14¼	14			4.30	5.65	5.50
29	4.87⅞	52¾	24 7/16	@14½	@14½	59¼	27¾	@4.35	@5.70	@5.55
30	.....	....	24½	.....	.....	.....	.....	.....	.....	.....
				14¼	14			4.30	5.65	5.50
1	4.87⅞	53¼	....	@14½	@14½	....	27¾	@4.35	@5.70	@5.55
				14¼	14			4.30	5.65	5.50
2	4.8 15	53⅜	24 5/16	@14½	@14½	57¾	28	@4.35	@5.70	@5.55
				14¼	14			4.30	5.65	5.50
3	4.8815	53¼	24½	@14½	@14½	60	28⅝	@4.35	@5.70	@5.55

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures

Copper.—Again we have to report a rather lifeless market. In Europe, the Whitsunday holidays have interfered with business, while over here the trade has been very much puzzled by the heavy decline in the London speculative market, as well as in copper shares. Under the circumstances, quotations are somewhat depressed, and more or less nominal at 14¼ @14½c. for Lake; 14@14½c. for electrolytic copper in ingots, cakes and wirebars; 14@14¼c. in cathodes; 13¾@14c. for casting copper.

The market for standard copper in London, which closed last Friday at £59 5s., declined on Tuesday to £57 15s., but reacted on Wednesday, the closing quotations on that day being cabled as £60@£60 2s. 6d. for spot, £58 5s.@£58 7s. 6d. for three months.

Statistics for the second half of May show an increase of 1,300 tons in the visible supplies.

Refined and manufactured sorts we quote: English tough, £64@£65; best selected, £65@£65 10s.; strong sheets, £73@£74; India sheets, £70@£71; yellow metal, 6⅝@6½d.

Exports and imports of copper at New York, Philadelphia and Baltimore in the week ending June 2, and for the year to date, are reported by our special correspondents as follows, in long tons:

Exports:	Week.	Year.
Austria	85	2,647
Belgium	....	789
France	100	9,380
Germany	344	10,719
Holland	585	17,497
Italy	66	1,311
United Kingdom	50	7,009
Other countries	195	2,699
Total copper	1,425	52,051
Matte	....	174
Imports:		
Copper	165	10,652
Matte	215	679

The movement this week shows a falling off. Of the imports 135 tons copper were from Japan, and 30 tons from Mexico, while the matte came from Great Britain.

Imports of copper into the United States, in all forms, with re-exports of foreign copper, are reported by the Bureau of Statistics of the Treasury Department as below, for the four months ending April 30; the figures being in long tons, of 2,240 lbs.:

Fine copper:	1902.	1903.	Changes.	
Imports	8,255	17,886	I.	9,631
Re-exports	1,846	934	D.	912
Net imports	6,409	16,952	I.	10,543
Ores and matte:				
Imports	16,694	86.571	I.	69,877
Re-exports	5,354	2,896	D.	2,458
Net imports	11,340	83.675	I.	72,335

As ores and matte are not reported separately, it is not possible to give the fine copper contents closely. Estimating as closely as possible, however, we find that the total net imports of fine copper in all forms, this year, was approximately 20,830 long tons.

Of the fine copper imported this year, 10,017 tons came from Mexico, and 2,653 tons, or 15 per cent, from Great Britain. Of the imports of ores and matte, 77,355 tons came from Canada. A large part of this was British Columbia ore, shipped to the Northport and other smelters.

Exports of domestic copper, in all forms, from the United States are reported by the Bureau of Statistics as below, for the four months, the figures being in long tons:

	1902.	1903.	Changes.	
Fine copper	61,586	46,578	D.	15,068
Ores and matte	9,752	3,005	D.	6,747

Again estimating the ores and matte, we find that the exports of fine copper, in all forms, were approximately 47,449 tons this year, against 65,724 tons last year, a decrease of 18,275 tons, or 27.8 per cent.

Tin.—The Banca sale, which took place last Thursday, did not stimulate the market to as large an extent

as was expected. Towards the end of the week, however, a better feeling prevails, and the market closes at the best, 28⅝c. for spot, 28¼c. for distant futures. Consumption remains as large as ever.

The foreign market, which closed last week at £124 10s., opened on Tuesday at £125, and the closing quotations on Wednesday are cabled as £129 5s.@£129 7s. 6d. for spot, £127 15s.@£127 17s. 6d. for three months.

Statistics for the month of May show an increase in the visible supplies of 2,400 tons.

Stocks of tin on June 1 are reported as below, in long tons of 2,240 lbs.:

	Store.	Afloat.	Totals.
London	2,060	3,750	5,810
Holland	3,433	478	3,911
U. S., exc. Pacific ports	2,537	4,205	6,742
Totals	8,030	8,433	16,463

The total shows a decrease of 555 tons, as compared with June 1, 1902.

Imports of tin into the United States for the four months ending April 30 were as follows, in long tons of 2,240 lbs.:

	1902.	1903.	Changes.
Straits	8,080	7,605	D. 475
Australia	135	87	D. 48
Great Britain	4,702	6,289	I. 1,587
Holland	453	376	D 77
Other countries	103	200	I. 97
Total	13,473	14,557	I. 1,084

The tin received from Great Britain is chiefly Straits tin; that from Holland is Banka and Billiton tin. About 96 per cent of the total receipts is Straits tin. The increase this year was entirely in Straits tin received by way of Great Britain.

Lead remains steady without any special feature. The ruling quotations are 4.15@4.27½c., St. Louis; 4.30@4.35c., New York.

The foreign market is again easier, Spanish lead being quoted at £11 8s. 9d.@£11 10s.; English lead, £11 11s. 3d.@£11 12s. 6d.

Imports of lead into the United States, with reexports of foreign lead, are reported as below by the Bureau of Statistics of the Treasury Department, for the four months ending April 30; the figures are in short tons, of 2,000 lbs.:

	1902.	1903.	Changes.
Lead, metallic	1,517	122	D. 1,395
Lead in ores and base bullion	36,480	33,252	D. 3,228
Total imports	37,997	33,374	D. 4,623
Re-exports	27,063	22,961	D. 4,102
Balance	10,934	10,413	D. 521

Of the imports this year, 29,378 tons, or 88 per cent of the total, were from Mexico, and 2,692 tons, or 7.6 per cent, from Canada. The balance over re-exports, shown above, is not consumed here, as a rule; most of it is retained in bond for future export. In addition to the re-exports given, there were 27 tons of domestic lead exported this year, against 1,092 tons last year.

St. Louis Lead Market.—Our special correspondent reports shipments for the week, as given to the Merchants' Exchange, 44,910 pigs, a decrease of 25,215 from the previous week. Receipts for the week were 56,235 pigs.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 16, that the price of silver during the week has been 13.25 reales per ounce. Exchange remains unaltered at 34.25 pesetas per £1. The local quotation for pig lead on wharf has been 66.50 reales per quintal of lead, which on above exchange is equal to £10 17s. 5d. per ton of 2,240 lbs., f.o.b. Cartagena. Exports for the week included 480,989 kgs. to Marseilles and 250,000 kgs. to London; a total of 730,989 kgs. pig lead. Exports of silver were 720 kgs. to Marseilles.

Spelter remains quiet but firm at last week's figures, 5.50@5.55c., St. Louis; 5.65@5.70c., New York. It is feared that the recent floods in Kansas will interfere with the production as well as with shipments, although it is rather early to form a definite opinion as to the extent of the damage done.

The foreign market is somewhat firmer, good ordinaries being quoted at £20 15s.; specials, £20 17s. 6d.

Exports of spelter from the United States for the four months ending April 30 were 932 short tons, against 1,572 tons in the corresponding period of 1902; a decrease of 640 tons. Exports of zinc ore were 15,251 tons, against 12,370 tons last year; an increase of 2,881 tons.

St. Louis Spelter Market.—Our special correspondent writes that the shipments for the week, as reported to the Merchants' Exchange, were 41,555 slabs, an increase of 5,950 over the previous week. Receipts were 31,325 slabs for the week, making 170,000 slabs for the month of May.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 9, that the local market is depressed owing to the weakness of the spelter, and some of the largest mines are refusing to sell their stock at the present quoted market prices. Shipments for the week were 1,925 tons blende to Antwerp.

Antimony is quiet, but steady. We quote: Cookson's at 7½@8c.; Hallett's, 6¾c.; Hungarian, French, Japanese, United States and Italian, at 6½c.

Imports of antimony into the United States for the four months ending April 30 were as follows, in pounds:

	1902.	1903.	Changes.
Metal and regulus	1,399,950	1,974,057	I. 574,107
Antimony ore	207,713	1,724,442	I. 1,516,729

This shows a very large increase, both in ore and metal, this year.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72½c. per gram.

Quicksilver.—The New York price is unchanged at $47.50 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is still $44.50@$46 per flask for domestic orders, and $42@$43 for export. The London price is £8 12s. per flask, with the same quotation asked by second hands.

Minor Metals and Alloys.—Wholesale prices, f.o.b. works, are as follows:

Aluminum.	Per lb.		Per lb.
No. 1 99% ingots	33@37c.	Ferro-Tungsten (37%)	28c.
No. 2 90% ingots	31@34c.	Magnesium	$2.75
Rolled Sheets	4c. up	Manganese, pure (N. Y.)	60c.
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum	33@39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	$2.10	Molybdenum (Best)	$1.82
Chromium, pure (N.Y.)	80c.	Phosphorus foreign	45c.
Copper, red oxide	50c.	Phosphorus American	70c.
Ferro-Molyb'um (50%)	$1.25	Sodium metal	50c.
Ferro-Titanium (10%)	90c.	Tungsten (Best)	62c.
Ferro-Titanium (20@25% N. Y.)	55c.		

Missouri Zinc Ore Market. May 30.

(From Our Special Correspondent.)

The highest price for zinc ore still rests at $40 per ton, but the market is stronger, as four or five times as much ore sold at this price this week as last. The demand was better for all grades, principally because the output has been greatly curtailed by heavy rains. An illustration of the situation is presented in a comparison of the total sales of last week with those of the corresponding time of last year, showing a decrease of 1,679 tons of zinc ore. It may be reasonably inferred that the sales a year ago were larger than the output, as the average sales of the year were only 5,049 tons per week, against 6,162 tons for that particular week, and the transactions of this week are larger than the output. Taking this view of the situation there is presented a remarkable condition in the zinc industry of the Joplin District—a situation where the output has reached the lowest point in five years. So many things have conspired to curtail the output during the five months of the year, that all the preparations of winter and early spring to increase the yield have proved futile, and, with all the mines it is possible to work being operated to their fullest capacity, the output has steadily declined all the year. The sales of this year have averaged only 4,705 tons of zinc ore per week, and as fully 10,000 tons of the ore marketed were carried over from last year, the output this year has averaged not to exceed 4,300 tons per week. The extraordinary rains of the past two weeks have reduced this average output 10 to 15 per cent at least, while some producers assert that a larger per cent of decrease will more accurately represent the situation as it now exists. Producers who have not sold are still holding back their ore, expecting prices to take a turn upward again on account of the enforced curtailment of the output.

Lead ore prices were steady and unchanged, this mineral being in demand at $54 per ton. A year ago lead ore sold at $44.50 and zinc ore at $34 per ton, top.

Following are the sales of zinc and lead from the various camps of the Joplin District for the week ending May 30:

	Zinc ore pounds.	Lead ore pounds.	Total value.
Joplin	2,308,850	327,510	$51,556
Carterville-Webb City	1,802,920	292,640	39,452
Duenweg	839,610	180,970	20,429
Galena-Empire	638,120	62,230	12,842
Aurora	638,120	12,090	10,531
Alba-Neck	503,330	.....	9,312
Zincite	472,750	.....	8,510
Granby	376,000	38,000	5,860
Oronogo	311,740	1,600	5,563
Prosperity	196,550	10,570	3,931
Carl Junction	169,610	.....	3,223
Cave Spring	118,800	34,700	2,886
Spurgin-Spring City	92,350	41,180	2,181
Central City	99,490	8,150	1,862
Mitchell	64,300	10,290	1,500
Carthage	81,030	.....	1,459
Diamond	64,170	.....	1,159
Reeds	63,990	.....	1,152
Badger	.....	19,250	520
Total sales the week	8,974,350	1,029,180	$183,928
Total sales 5 months	207,029,770	24,345,510	$4,166,701

Zinc value this week, $156,137; 22 weeks, $3,501,398. Lead value this week, $27,791; 22 weeks, $665,303.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	30.15	26.32	4.442	4.075	5.349	4.28
April	29.81	27.77	4.567	4.075	5.550	4.37
May	29.51	29.85	4.325	4.075	5.639	4.47
June	....	29.36	....	4.075	....	4.94
July	....	28.38	....	4.075	....	5.27
August	....	28.23	....	4.075	....	5.44
September	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.33
November	....	25.68	....	4.075	....	5.18
December	....	25.68	....	4.075	....	4.73
Year	....	26.79	....	4.069	....	4.84

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.861c.; for March, 5.174c.; for April, 5.375c.; for May, 5.469c.

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	Lake. 1903.	Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.49
February	12.778	12.173	12.901	12.378	57.34	55.16
March	14.416	11.882	14.572	12.188	63.85	53.32
April	14.454	11.618	14.642	11.986	61.72	52.79
May	14.435	11.856	14.618	12.226	61.73	54.03
June	.....	12.110	.....	12.360	....	53.93
July	.....	11.771	.....	11.923	....	52.93
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.480	.....	11.760	....	52.68
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.08
December	.....	11.480	.....	11.599	....	50.95
Year	.....	11.626	.....	11.887	....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	22.49	48.72	25.00	54.23	27.04	60.63
April	23.38	50.56	24.34	52.72	27.30	59.29
May	25.89	54.11	23.71	51.31	27.43	59.64
June	....	....	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.28
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
Alma Oil, Cal.	June 1	.03	$11,400	$22,800
†Am. Cement	June 15	.40	80,000	620,000
†Am. Sm. & Ref., pf.	June 7	1.75	875,000	11,516,553
Annie Laurie	Utah 1	1.00	50,000	185,000
Barreno, Mex.	June 15	.86	2,064	53,946
†Breece, Colo.	June 1	.05	10,000	200,000
Calumet & Hecla, Mich.	June 19	10.00	1,000,000	81,350,000
*Central Lead, Mo.	June 15	.50	5,000	355,000
Four Oil, Cal.	June 10	.01	2,087	35,566
†National Lead, pf.	June 15	1.75	260,820	13,448,528
Silver King, Utah	June 10	.66⅔	100,000	6,650,000
†Standard Oil,	June 15	7.00	6,790,000	190,225,000
St. John del Rey, Brazil	June 26	.16	87,402	14,093,397
*Thirty-Three Oil, Cal.	June 6	.10	10,000	180,000
†Trimountain, Mich.	June 10	1.50	150,000	300,000
†U. S. Red. & Ref., pref.	June 20	1.50	59,187	413,634
†U. S. Red. & Ref. com.	June 20	1.00	59,188	354,790

* Monthly. † Quarterly.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt
Ajax	Utah	4	June 11	June 29	.05
Ben Butler	Utah	10	June 15	July 2	.00¼
Cadmus	Cal.	..	June 25	.....	.04
Carisa	Utah	..	June 2	June 30	.03
Challenge Con.	Nev.	..	June 23	July 14	.05
Chollar	Nev.	62	May 21	June 11	.10
Confidence	Nev.	39	May 19	June 8	.20
Con. Cal. & Va.	Nev.	..	June 2	June 25	.25
Gachupines	Mex.	..	June 6	.....	.01
Golconda	Utah	5	June 27	July 17	.04¼
Golden Channel Drift	Cal.	3	May 23	June 20	.01½
Grape Vine Canyon	Cal.	..	June 8	.....	.05
Justice	Nev.	..	June 8	June 27	.10
Little Chief	Utah	16	June 8	June 25	.01
Marina Marsicano	Cal.	35	May 25	June 15	.05
Martha Washington	Utah	..	May 19	June 8	.01
Mexican	Nev.	74	June 10	July 1	.10
Morgan	Cal.	..	June 16	.....	.05
Mountain Lake	Utah	..	June 8	July 6	.005
New York Bonanza	Utah	..	July 1	July 21	.03
Occidental	Nev.	42	June 18	July 9	.10
Old Colony & Eureka	Utah	5	June 11	June 29	.01
Romeo Con.	Utah	..	May 22	June 9	.05
Scorpion	Nev.	..	June 15	July 17	.05
Shenandoah Con.	Cal.	..	June 18	.....	.02
South Eureka	Cal.	..	June 25	.....	.03

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	May 27. H.	May 27. L.	May 28. H.	May 28. L.	May 29. H.	May 29. L.	May 30.* H.	May 30.* L.	June 1. H.	June 1. L.	June 2. H.	June 2. L.	Sales
Amalgamated c., Mont	100	62¾	61⅝	61	57⅜	59	56¾	....	....	58⅛	57⅛	57⅜	55⅛	249805
†Anaconda c. Mont.	25	96	94⅛	90¾	85	90	90	....	....	90¼	86¼	87	87	7,700
Anaconda Gold, Colo.	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Andes, Nev.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Argentum, J., Colo.	2	....	....	....	....	....	....	....	....	....	....	....	....	....
Belcher, Nev.	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Best & Belcher, Nev	3	....	....	....	....	1.72	....	....	....	....	....	....	....	100
Bullion, Nev.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Brunswick, Cal.	1	8⅛	8⅛	8¼	8	8	8	....	....	8	8	8	8	1,540
Caledonia, Nev.	2½	....	....	1.60	....	....	....	....	....	....	....	....	....	100
Chollar, Nev.	3	....	....	.30	....	....	....	....	....	36	....	....	....	600
C. K. & N., Colo.	1	....	....	....	....	....	....	....	....	18½	....	....	....	1,000
Comstock T., s., Nev.	2	....	....	....	....	....	....	....	....	....	....	....	....	....
Comst T. Bonds	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. Cal. & Va., g. s. Nev	2½	....	....	1.35	....	....	....	....	....	1.90	1.85	2.00	1.90	1,625
Com. Imperial, Colo.	1	.05	....	.07½	....	.07	.07½	....	....	....	....	.08	....	5,500
Cripple Creek c., Colo.	1	....	....	.05	....	....	....	....	....	.05½	....	....	....	2,000
Elkton g., Colo.	1	....	....	.41	.39	....	....	....	....	....	....	.40	....	1,400
El Paso, Colo.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Dollar, Colo.	1	....	....	....	....	.05	....	....	....	....	....	....	....	800
Golden Fleece, Colo.	1	....	....	....	....	....	....	....	....	.15	....	....	....	400
Greene Con., c., Mex.	10	22	22	22½	21⅝	22	21¾	....	....	21¾	21¼	21¾	21¾	4,491
Hale & Norcross	3	20	....	....	....	....	....	....	....	....	....	.74	....	300
Homestake, S. Dak.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver, Utah	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Isabella, g., Colo.	1	.18	....	....	....	.18	....	....	....	....	....	.18	....	1,400
Justice, Nev.	1	....	....	....	....	....	....	....	....	....	....	.11	....	400
Mexican, Nev.	3	....	....	....	....	....	....	....	....	1.10	....	....	....	100
Mollie Gibson, Colo.	5	....	....	....	....	....	....	....	....	.07	....	....	....	500
Moon-Anchor, Colo.	5	....	....	....	....	....	....	....	....	.09	....	....	....	500
Ontario, Utah	100	5½	5½	....	....	....	....	....	....	....	....	....	....	20
Ophir, s., Nev.	1	....	....	....	....	....	....	....	....	....	....	2.11	....	300
Portland, Colo.	10	....	....	1.38	....	....	....	....	....	1.35	1.33	1.35	....	960
Potosi, Nev.	3	.27	....	.32	....	.32	....	....	....	.38	....	....	....	1,800
Quicksilver, Cal.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Nevada, Nev	3	.58	....	....	....	....	....	....	....	....	....	....	....	300
Silver Hill, Nev	1	1.20	....	....	....	1.25	....	....	....	....	....	1.35	....	300
Small Hopes, Colo.	20	....	....	....	....	....	....	....	....	....	....	....	....	....
Tenn. c., Tenn	25	28	22	28½	27½	29	28½	....	....	29	28¼	27½	27½	1,250
Union Con., Nev.	2½	....	....	....	....	....	....	....	....	1.00	.95	....	....	300
Union Cop., N. C.	10	1⅝	1⅝	1⅝	1⅝	....	....	....	....	1⅝	1⅝	....	....	575
Utah Con., Nev.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Vindicator, Colo.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
White Knob. g. s., Ida	100	15¼	15	14¾	14¾	....	....	....	....	....	....	....	....	700
Yellow Jacket, Nev.	3	....	....	....	....	....	....	....	....	....	....	....	....	....

*Holiday. Total sales 286,606 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	May 27. H.	May 27. L.	May 28. H.	May 28. L.	May 29. H.	May 29. L.	May 30.§ H.	May 30.§ L.	June 1. H.	June 1. L.	June 2. H.	June 2. L.	Sales
Adventure Con., c.	$25	100,000	7	....	7¼	....	7¼	7	....	....	7	6¾	6¼	6¼	725
Allouez	25	59,511	6¾	....	6¾	6	5¾	5½	....	....	5⅛	5⅛	5¾	5¾	1,712
Amalgamated, c.	100	1,538,879	62⅛	61¾	61	57⅛	59	56⅜	....	....	57⅜	57	57⅜	55⅜	39,394
Am. Z. L. & Sm.	25	60,000	10	....	10	....	....	....	....	....	....	....	....	....	400
Arcadian, c.	25	150,000	3	....	....	....	3	2¾	....	....	2¾	....	2¼	2¼	740
Arnold.	25	60,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic, c.	25	100,000	10¼	10	....	....	9⅝	9⅛	....	....	9⅛	9	....	....	630
Bingham Con., g. s.	50	150,000	29	28¼	28⅛	27½	27½	27	....	....	27¾	26	27	26¼	1,920
Cal. & Hecla, c.	25	100,000	515	....	....	....	....	....	....	....	....	503	500	....	36
Catalpa.	10	300,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Centennial, c.	25	90,000	23	22¾	21¾	19½	20¼	19¼	....	....	20¼	19⅝	20	19	5,044
Central Oil	25	60,550	....	....	....	....	6¾	....	....	....	....	....	6¾	6¾	150
Con. Mercur, g.	5	1,000,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Continental Zinc	25	22,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Copper Range Con.	100	285,000	60¾	60	59¾	57	58	56⅝	....	....	57¼	56⅛	....	....	8,717
Crescent	10	300,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Daly-West., g. s.	20	180,000	47	....	46½	45¾	46	45	....	....	....	....	45½	45½	594
Dominion Coal.	100	150,000	94½	....	94	91½	....	....	....	....	90½	85	86	70	7,685
Dominion Coal, pf.	100	30,000	....	....	....	....	116	....	....	....	....	....	....	....	2
Dominion I & S.	100	100,000	20	19	19⅝	18	18½	18	....	....	18	14	....	....	6,045
Elm River.	12	100,000	3¼	....	3⅜	3	3	....	....	....	3¼	....	3¼	3	900
Franklin, c.	25	100,000	9	....	9	....	9	....	....	....	5	8¾	8⅞	8⅜	400
Granby.	10	1,336,303	....	....	4⅞	4¾	4¾	....	....	....	4⅜	....	5	4¾	1,055
Guanajuato, Con.	5	385,000	....	....	1⅜	1⅜	....	....	....	....	2	....	1⅜	1⅜	720
Isle Royale Con., c.	25	385,000	....	....	8	7⅞	8	7¾	....	....	8	....	....	....	860
Mass Con., c.	25	100,000	7⅜	7¼	7	....	7	....	....	....	7	....	7	7	410
Mayflower, c.	25	100,000	1¾	....	....	....	....	....	....	....	....	....	....	....	50
Michican c.	25	100,000	6¾	....	6½	....	6¾	6	....	....	8⅛	8	8	8	590
Mohawk, c.	25	100,000	47½	47	47	46	46	45¾	....	....	47	45½	45½	45¼	2,005
Mont. Coal & Coke.	25	200,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Mont'l & Boston, c.	5	570,000	1⅝	....	....	....	1⅛	....	....	....	1⅜	....	1⅜	1¼	2,250
National.	25	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
New Idria.	5	100,000	....	....	....	....	8¼	....	....	....	9	....	....	....	190
Nova Scotia St. & C.	100	....	....	....	....	....	....	....	....	....	90	....	....	....	10
Nova Scotia St. & C. pf	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Old Colony, c.	25	100,000	....	....	....	1¼	....	....	....	....	....	....	1	1	500
Old Dominion, c.	25	150,000	16⅜	15¾	16¼	16	....	....	....	....	....	....	....	....	160
Osceola, c.	25	96,150	64	63	63	60	60	59	....	....	60	59	59	59	947
Parrot, s. c.	10	229,850	26	24½	25	24½	24	23	....	....	24	23½	23¼	22½	484
Phoenix Con., c.	25	100,000	....	....	4⅛	....	....	....	....	....	....	....	....	....	30
Quincy, c.	25	100,000	105¾	....	105	103	....	....	....	....	....	....	....	....	65
Rhode Island, c.	25	100,000	2¼	....	....	....	....	....	....	....	2⅜	....	....	....	95
Santa Fe, g. c.	10	250,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Shannon, c.	10	188,153	13¼	12¾	12¾	12½	....	....	....	....	12⅜	....	12½	12⅜	2,425
Tamarack, c.	25	60,000	....	....	119	110	115	110	....	....	112	....	....	....	160
Trimountain	25	100,000	88	....	88	....	87¾	....	....	....	87¾	....	87½	87½	650
Trinity, c.	25	100,000	7¾	7½	7¾	6¾	7½	6½	....	....	7⅜	6¾	7¼	7	2,895
United Copper	100	450,000	....	....	....	....	....	....	....	....	....	....	....	....	....
United States, g.	25	419,000	23¼	22¾	22¾	22	22½	21¾	....	....	21¾	21¾	22	21¾	7,322
U. S. Coal & Oil.	25	240,000	12¾	12⅝	12⅝	12⅜	12¾	12¼	....	....	12⅛	....	13	12⅜	2,897
Utah Con., g.	5	300,000	32¼	31¾	31⅝	29½	30⅜	29½	....	....	30¼	29½	30	29	14,107
Victoria, c.	25	100,000	5	....	5	4¾	5	....	....	....	....	....	4¾	4¾	570
Washington	25	60,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Winona, c.	25	100,000	11	10¾	10⅛	9½	10	9⅝	....	....	10	9½	10	9⅝	3,787
Wolverine, c.	25	60,000	70	....	70	....	70	65	....	....	70	....	69	68¾	3 27
Wyandot.	25	100,000	2	....	2	1¾	2	....	....	....	....	....	1¾	1¾	525

*Boston Stock Exchange. †Ex Dividend. ‡Assessment Paid. Total sales, 121,310 shares. §Holiday.

SAN FRANCISCO.*

Name of Company.	Location.	Capitalization.	May 19.		May 20.		May 21.		May 22.		May 23.		May 25.		Sales.
				L.	H	L.	H.	L.			H.	L.	H.	L.	
Central Eureka.	Cal.	$400,000	.95	....	....	....	....	....	....	....	....	....	....	....	1,000
Coleban.	Nev.	1,000,000	.22	....	.24	.23	.27	.25	.28	.26	.30	.29	.30	....	6,600
Esperanza.	Nev.	1,000,000	.14	.13	.14	....	.15	.14	....	....	.15	.14	.14	.16	800
Esla Con.	Nev.	750,000	.25	....	....	....	.25	....	....	....	....	....	....	....	1,500
Gipsy Queen.	Nev.	750,000	.25	....	.25	....	.26	.25	.26	....	....	....	....	....	2,700
Gold Ultu, Con.	Nev.	750,000	....	....	.21	.20	.25	.23	.24	.22	.26	.24	.27	.25	9,500
Lucky Tom	Nev.	1,000,000	....	....	....	....	....	....	.15	.17	.17	.16	.17	.15	7,500
MacNamara.	Nev.	500,000	.50	.48	.50	....	.51	.50	.50	....	.51	.48	.50	....	4,300
Mont-Tonopah.	Nev.	1,000,000	....	....	1.15	....	1.25	1.15	1.25	....	1.25	....	1.22½	1.20	3,700
Paymaster.	Nev.	750,000	.25	.20	.23	.20	.31	.23	.31	.28	.44	.31	.38	.27	15,000
Rescue.	Nev.	500,000	....	....	....	....	.23	....	.25	.23	.25	.22	.22	....	900
Salt Lake & Ton.	Nev.	300,000	....	....	....	....	....	....	.70	....	.75	....	.75	....	300
Tonopah-Belmont.	Nev.	2,000,000	2.00	....	....	....	2.15	2.05	2.20	....	....	....	2.50	2.30	1,330
Tonopah Fraction.	Nev.	750,000	....	....	....	....	....	....	....	....	1.20	....	1.20	....	200
Tonaph Midway.	Nev.	1,000,000	.55	....	.50	....	.50	....	.55	....	....	....	.65	.64	3,800
Tonopah North Star.	Nev.	750,000	....	....	....	....	....	....	....	....	....	....	.16	....	100
Tonopah Union.	Nev.	750,000	1.00	.98	1.02½	1.00	1.10	....	1.50	1.15	....	....	1.50	1.30	3,100
United Tonopah.	Nev.	1,000,000	.21	.20	....	....	....	....	....	....	.20	....	....	....	1,200
Utopia.	Nev.	1,000,000	....	....	....	....	.25	.18	.16	....	....	....	....	....	3,000

*San Francisco & Tonopah Mining Exchange. Total sales, 110,530 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	May 27. H.	May 27. L.	May 28. H.	May 28. L.	May 29. H.	May 29. L.	May 30.§ H	May 30.§ L.	June 1. H.	June 1. L.	June 2. H.	June 2. L.	Sales
Ailis-Chalmers, U. S.	100	....	....	14¾	14¾	15	15	....	....	....	....	14	14	264
Allis-Chalm's, pf, U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Agr. Chem., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Agr. Chem. pf, U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Sm. & Ref., U.S.	100	48¾	48¾	48	47⅜	48¾	48	....	....	48	47	47¾	47¼	5,150
Am. Sm. & Ref. pf, U.S.	100	120½	120⅝	94⅞	94	94½	94⅜	....	....	94	94	94¼	94¼	1,240
Am. Steel & Fdy., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. S. & Fdy. pf., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Col. Fuel & I., Colo.	100	69¼	67¾	69	66¾	69	67⅜	....	....	66⅜	65¾	67¼	66⅜	9,145
Col. & H. C. & I., Colo.	100	17¼	17¼	17	17	17¼	16	....	....	....	....	17	15	1,000
†Crucible Steel, U. S.	100	17	16⅞	17	16⅞	17	16	....	....	16⅛	16	16	15¾	5,340
†Crucible Steel, pf, U S	100	82	81½	82	81⅛	82	81⅛	....	....	81½	81¼	81⅛	81	1,501
†Mong. R. Coal, Pa.	100	10½	10⅛	10⅜	10⅛	10⅛	10⅛	....	....	10½	10⅜	10⅝	10⅝	3,650
†Mong. R. Coal pf, Pa	100	....	....	....	....	....	....	....	....	39⅞	39⅞	40	40	150
National Lead, U.S.	100	17¾	17¼	17¾	17¼	17	17	....	....	16⅝	16¼	16¼	16	4,550
National Lead pf, U.S.	100	....	....	....	....	85¼	85¾	....	....	85¼	85¼	80¼	80¼	314
†Phila Nat. Gas.	100	42½	42¼	42	42	41¼	40	....	....	41¾	41¾	41¾	41¾	621
†Phila Nat. Gas, pf	100	....	....	....	....	....	....	....	....	....	....	....	....	....
†Pittsburg Coal, Pa.	100	28¼	28	28¾	28	28	28	....	....	27⅞	27⅝	27¾	27½	1,625
†Pittsburg Coal pf, Pa	100	87¾	87½	87¾	87½	87	86¾	....	....	86¾	86⅝	87	86⅝	501
Republic I & S., U.S.	100	16⅝	16	16	14¾	15¾	15	....	....	15	15	16	14¾	7,075
Republic I.&S., pf, U.S.	100	76¾	76	75¾	74¾	75	74⅜	....	....	....	....	75¼	74⅜	2,000
Sloss-Shef S. & I., Ala.	100	51	51	50	49	48⅝	48	....	....	47½	42½	43	41¾	3,130
Sloss-Shef S. & I. pf, Ala.	100	....	....	87	87	89	89	....	....	88	88	88	88	320
Standard Oil, U.S.	100	653	650	649	648	650	650	....	....	650	649	651	650	279
Tenn. C. I. & R. R., Ala.	100	57	56¾	....	....	58	54½	....	....	55	54¾	....	....	13,760
U. S. Red & Ref., U. S.	100	....	....	....	....	....	....	....	....	....	....	31	31	100
U.S. Red & R. pf., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
U.S. Steel Corp., U.S.	100	32¼	31¼	31¾	31	31⅜	30⅞	....	....	31⅛	30⅜	31⅜	31	123853
U.S. Steel Corp. pf, U.S.	100	82¼	81½	81¾	80⅝	81⅜	80¾	....	....	81	80¾	81¾	80½	44,150
Va.-Car Chem., U.S.	100	58⅞	57¾	57⅞	57	57¾	57¾	....	....	57⅛	55	57⅞	56⅜	3,215
Va.-Car Chem. pf, U.S.	100	....	....	....	....	....	....	....	....	....	....	119	118	200
Va. I. C. & Coke, U. S.	100	....	....	....	....	....	....	....	....	29	29	....	....	100
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

*New York Stock Exchange. †Pittsburg Stock Exchange. ‡Ex-Dividend. Total sales, 233,183 shares. §Holiday.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	May 25. H.	May 25. L.	May 26. H.	May 26. L.	May 27. H.	May 27. L.	May 28 H.	May 28 L.	May 29. H.	May 29. L.	May 30.† H.	May 30.† L.	Sales
Acacia.	$1	.09	.08⅞	09⅛	.09	.10	.09	.09⅛	.09	.09⅛	.09	....	....	5,000
Am. Con.	1	.03	....	.02¾	.02½	.03	....	.02¾	....	.02½	....	....	....	1,000
Anaconda.	1	.15½	....	.20	.13⅜	.20	.15½	.15½	....	.17¾	.15	....	....	....
Ben Hur.	1	.02¾	.02	.02¾	.02	.02¾	.02	.02¼	.02	.02¼	.02	....	....	1,000
Blue Bell.	1	.05¾	....	.05	....	.05	....	.05¾	....	.05¼	....	....	....	....
C. C. & M.	1	.02¾	.02	.02¼	.02	.02¾	.02	.02¾	.02	.02¼	.02	....	....	3,000
C. K. & N.	1	.20	.19¾	.20	.19	.19½	.19¼	.19½	.19¼	.20	.19¼	....	....	4,000
C. C. Con.	1	.05	.04	.05	.04	.05	.04	.05	.04	.04½	.04	....	....	2,000
Coriolanus.	1	.02¾	....	.03	.02½	.02¾	....	.02¾	....	....	....	....	....	....
Des Moines.	1	.03	.02¾	.03	.02¾	.03½	.02¾	.03	.02¾	.02¾	....	....	....	1,000
Dr. Jack Pot.	1	.09¼	.08¾	.09	.08¾	.09	.08¾	.09	.08¾	.09	.08	....	....	25,000
Elkton Con.	1	.40¾	.40	.40¾	.40	.40¼	.39¾	.40¾	.39¾	.40	....	....	....	5,070
El Paso	1	.64	.63¾	.63	.62¾	.63	.62	.63	.61¾	.65	.69	....	....	9,000
Fannie Rawlings.	1	.04	.03½	.04	.03¾	.04	.03¾	.03¾	....	.04	.03¾	....	....	1,000
Findley.	1	.15	.12	.15	.13	.11¾	.13¾	.14¼	.14	.14	.13	....	....	5,000
Gold King.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Dollar Con.	1	.05½	.05¾	.05¾	.05½	.05½	.05¾	.05¾	.05½	.05½	.05¾	....	....	8,000
Golden Cycle.	1	.73	.70	.73	.70	.69½	....	.72½	.69¼	.69½	....	....	....	500
Golden Fleece	1	.11	.05	.10	.06	.11	.06	.10	.07	.11	.05	....	....	....
Gould.	1	.03¼	.03	.03¼	.03	.03⅜	.03	.03¼	.03	.03¼	.03	....	....	9,000
Hart.	1	.02	....	.02	....	.02	....	.02	....	.02	....	....	....	....
Isabella.	1	.16¾	.16¾	.16¾	.16¾	.16¾	.16¾	.16	.16¼	.16	.16	....	....	6,500
Jack Pot.	1	.08¾	.07¾	.08¾	.07¾	.09	.07¾	.08¼	.07¾	.08¼	.07	....	....	200
Last Dollar.	1	.70	....	.70	....	.70	....	.70	....	.60	....	....	....	....
Lexington.	1	.04½	.03¾	.04½	.03¾	.04¼	.03¾	.04¼	.03¾	.04¼	.03¾	....	....	1,000
Little Puck.	1	.03	....	.03¼	.03	.03¼	.03	.03¼	.03	.03¼	.03	....	....	6,000
Mollie Gibson.	1	.06¾	.05¼	.06¾	.05½	.06¾	.05½	.06¾	.05½	.07	.05½	....	....	....
Moon Anchor.	1	.08½	.07¾	.08¼	.07¾	.08½	.07¾	.08	....	.08	.07	....	....	....
New Haven.	1	.02¾	.02½	.02¾	.02¼	.02¾	.02¼	.02¾	.02½	.03	.02¾	....	....	1,000
Pharmacist.	1	.05	.04¼	.05	.04¾	.05¼	.04¾	.04¾	.04¾	.04¾	....	....	....	3,000
Pinnacle.	1	.04¼	....	.04¼	....	.04¼	....	....	....	.04¼	....	....	....	....
Pointer.	1	.01¾	.01¼	.01¾	.01	.01¾	.01	.01¾	.01	.01¾	.01	....	....	2,000
Portland.	1	1.30	1.25	1.30	1.25	1.35	1.26	1.32	1.27	1.35	1.20	....	....	1,000
Prince Albert.	1	.02	.02¾	.03	.02¾	.03	.02¼	.03	....	.03	.02¾	....	....	3,000
Vindicator.	1	.95	.80	.90	.80	.95	.82	.92	.80	.95	.80	....	....	....
Work.	1	.06¾	.06¼	.06¾	.06¾	.06¾	.06¾	.06¾	....	.06¾	....	....	....	7,000

*Colo. Springs Mining Stock Exchange. †Holiday. All mines are in Colorado. Total sales 110,270 shares.

COLORADO SPRINGS. (*By Telegraph.*)

Name of Company.	June 1. H.	June 1. L.	June 2. H.	June 2. L.	Name of Company.	June 1. H.	June 1. L.	June 2. H.	June 2. L.
Acacia.	....	....	.09	.08⅞	Isabella.	....	....	.16¾	.16
Am. Con.	....	....	.02¼	.02	Jack Pot.	....	....	.10	.07
Anaconda.	....	....	.20	.15	Keystone.	....	....	.05½	.05
Blue Bell.	....	....	.06¼	.05	Last Dollar.	....	....	.60	.36
Cripple Creek Con.	....	....	.05	.04¼	Lexington.	....	....	.04¾	.03¾
C. K. & N.	....	....	.20	.19	Little Puck.	....	....	.03¼	.03
Doctor Jack Pot.	....	....	.09	.08¾	Mollie Gibson.	....	....	.06¾	.05½
Elkton, Con.	....	....	.40¾	.40	Moon Anchor.	....	....	.08	.07
El Paso.	....	....	.62	.60	Old Gold.	....	....	.06¾	.06¾
Findley.	....	....	.14¾	.12	Pharmacist.	....	....	.04¼	.04
Gold Dollar Con.	....	....	.06¾	.05¾	Pinnacle.	....	....	.04¾	.03¾
Golden Cycle.	....	....	.73	.70½	Portland.	....	....	1.35	1.27
Golden Fleece.	....	....	.10	.05	Vindicator.	....	....	.91	.89½
Gould.	....	....	.04	.03	Work.	....	....	.06¾	.06¼

SAN FRANCISCO (*By Telegraph*)

Name of Company.	June. 1.	June. 2.	Name of Company.	June. 1	June. 2.
Belcher.	.51	.44	Justice.	.05	.05
Best & Belcher.	2.25	2.25	Mexican.	1.35	1.15
Caledonia.	1.35	1.30	Occidental Con.	.36	.32
Challenge Con.	.53	.47	Ophir.	2.01	1.75
Chollar.	.35	.32	Overman.	.41	.41
Confidence.	1.40	1.40	Potosi.	.41	.41
Con. Cal. & Va.	1.80	1.70	Savage.	.30	.25
Con. Imperial.	.07	.08	Sierra Nevada.	.88	.84
Crown Point.	.30	.27	Union Con.	1.10	.96
Gould & Curry.	.53	.49	Utah Con.	.54	.51
Hale & Norcross.	.72	.69	Yellow Jacket.	.54	.53

STOCK QUOTATIONS.

MEXICO*. May 22.

Name of Company	Share Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200	.....	10,000	.....
Guananjuato.				
Angustias, Pozos	2,400	5.00	70	75
Cinco Senores y An., aviadoras	2,000	15.00	190	195
Cinco Senores y An., aviada	400	10.00	175	180
Providencia, San Juan de la Luz	6,000	2.00	135	138
Queensland y Australia	300	.....	85	100
Guerrero.				
Delfina, 1st serie	2,500	.....	45	40
Delfina, 2d serie	2,500	.....	30	29
Garduno y Anexas	7,200	.....	35	69
Hidalgo.				
Amistad y Concordia	9,000	6.90	72½	74
Carmen, aviada	1,100	.....	160	175
Guadalupe Fresnillo Mill	1,000	.....	250	300
Guadalupe Fresnillo Mine	1,400	.....	70	80
La Blanca, aviadora	1,536	.....	1,100	1,120
La Blanca, aviada	768	.....	850	880
La Reina y An., aviadora	5,000	.....	19	21
Luz de Maravillas, aviadas	1,100	.....	20	.....
Maravillas y An., aviador	1,680	.....	90	.....
Maravillas el Lobo	1,000	.....	130	180
Palma y An., aviador	1,800	.....	.....	12
Real del Monte	2,554	10.00	650	700
Refugio, avadia	12,830	.....	7	5
Santa Ana y An., aviadora	1,800	.....	30	40
Santa Ana y An., aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,000	.....	.....	7
Sta. Gertrudis y An., aviadora	28,800	1.00	70	80
Santo Tomas Apostol aviadoras	5,100	.....	1	3
San Felipe de Jesus, aviadora	3,600	.....	25	30
San Felipe de Jesus, aviada	1,200	.....	.....	10
San Rafael y An., Trompillo	1,200	12.00	1,030	1,050
San Rafael y An., aviadas	1,200	4.00	380	390
Soledad, aviada	960	10.00	365	375
Sorpresa, aviada	960	5.00	310	310
.....	.....	.....	.....	.....

Name of Company.	Shares Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Mexico.				
Alacran	$2,400	.....	35	45
Aldebarran	.....	.....	75	73
Buen Despacho	3,000	.....	60	65
Dos Estrellas	3,000	30.00	2,300	2,400
La Esperanza (El Oro)	3,000	10.00	1,320	1,350
La Reformia, aviadores	2,000	.....	60	70
Providencia, pagadoras	1,600	.....	12	10
Providencia, liberadas	900	.....	12	10
Santa Ana, Esperanza	2,400	.....	70	90
Michoacan.				
Luz de Borda, aviadora	3,000	.....	90	98
Luz de Borda, aviada	1,000	.....	24	26
Nerevo Leon:				
La Fraternal	1,000	.....	600	550
Norias de Bajan	1,000	.....	600	550
Santiago y An., Tlal.	4,000	.....	8	5
San Luis Potosi.				
Concepcion y An.	3,000	.....	85	90
El Barreno, aviadora	2,000	2.00	37	40
Sta. Maria de la Paz	2,400	20.00	690	700
San Diego y Annexas	2,400	4.00	10	12
Zacatecas.				
Asturiana y An.	2,500	.....	75	95
Candelaria y Pinos	2,500	10.00	290	300
Cubiertas	2,400	.....	15	7
Esperanza y An.	2,400	.....	50	60
Lourdes	2,500	.....	25	37
Luz de Minillas, pagadoras	2,000	.....	18	25
Nueva Quebradilla, aviadoras	2,400	.....	42	35
Nueva Quebradilla, aviadas	600	.....	45	40
San Carlos y Annexas	2,500	20.00	145	150
Sta. Maria de Gaud.	2,500	10.00	55	60
Miscellaneous.				
Bartolome de Medina	2,000	1.50	72	75
Guadalupe Hacienda	10,000	6.00	.....	.....
La Luz Hac. (Pachuca)	3,750	.....	280	290
La Reina (Chihuahua)	192	.....	.....	.....
Naica (Chihuahua)	100	.....	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	10.00	700	900
Natividad (Oaxaca) aviadas	600	4.00	700	900
San Francisco Hac.	6,000	1.00	55	60
Santa Ana Huantla Morelos	4,000	.....	.....	.....
Union Hacienda	3,000	6.00	220	240

*Values are in Mexican currency.

SALT LAKE CITY.* May 92.

Name of Company	Shares.	Par Val	High	Low	Sales.
Ajax	300,000	$10	.23	.22½	1,700
Ben Butler	500,000	1	.14	.13	12,200
California	300,000	1	.14¾	.13¾	11,700
Con. Mercur	1,000,000	5	1.28	1.25	1,000
Creole	.....	.....	.00¾	.80	1,200
Comstock	.....	.....	1.70	1.65	1,200
Daly	.....	.....	1.80	1.80	700
Daly-Judge	300,000	1	9.75	9.00	1,470
Daly-West	300,000	20	47.15	45.55	187
Grand Central	250,000	1	5.00	4.90	250
L. Mammoth	150,000	1	1.77	1.20	81,300
M. Washington	300,000	.....	.04¾	.03½	14,400
Mammoth	400,000	25	1.15	1.07½	750

Name of Company.	Shares.	Par Val	High	Low	Sales.
Majestic Cop	.....	.....	3.75	3.75	100
May Day	400,000	0.25	.24¾	.23	72,100
N. Y. Bonanza	.....	.....	.29	.25½	20,400
Naildriver	.....	.....	1.75	1.75	300
Petro	.....	.....	.08	.08	1,000
Sacramento	1,000,000	5	.28¾	.26¾	12,800
Silver Shield	.....	.....	.07	.06	11,500
Star Con	500,000	1	.42	.27	60,450
Uncle Sam	500,000	1	.30	.26½	9,850
Utah	100,000	10	.75	.75	25
Victor	500,000	1	.23½	.22	6,900
Wabash	.....	.....	.27½	.25¾	22,800
Yankee Con	500,000	1	.41¼	.39	3,30

All mines are in Utah. *By our Special Correspondent. Total sales, 348,782 shares.

ST. LOUIS, MO.* May 29.

Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.60	$0.80
Catherine Lead, Mo.	500,000	10	1.80	3.00
Central Coal & C.	1,875,000	100	63.00	64.00
Central C. & C., pf.	1,875,000	100	73 75	74 75
Central Lead, Mo.	1,000,000	10	120 00	130.00

Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.
Columbia Lead, Mo.	$500,000	10	$12.00	15.00
Con. Coal, Ill.	500,000	100	22.50	23.50
Doe Run Lead Co.	1,500,000	100	107.50	111.00
Granite Bimet., Mt.	1,000,000	10	0 80	0.80
St. Joe Lead, Mo.	6,000,000	10	16 00	17.00

*From our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	May 27. H.	May 27. L.	May 28. H.	May 28. L.	May 29. H.	May 29. L.	May 30.† H.	May 30.† L.	June 1. H.	June 1. L.	June 2. H.	June 2. L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Cement	10	7⅛	7⅛	7⅛	7⅛	.....	.....	.....	.....	.....	.....	.....	.....	460
Cambria Iron, Pa.	50	47	47	.....	.....	47	47	.....	.....	.....	.....	47	47	79
Cambria Steel, Pa.	50	23⅛	23	23¼	22⅞	22⅛	22⅜	.....	.....	23⅛	23	23¼	23	4,624
Penn. Steel, pfd.	100	90	90	.....	.....	90	90	.....	.....	.....	.....	.....	.....	30
Susq. I. & S., Pa.	50	.....	2	.....	2	2	2	.....	.....	2	2	2	2	784
United Gas I., Pa.	50	91⅜	91¼	91½	90¾	91	90½	.....	.....	90⅝	90⅛	90¼	90	3,892
Warwick I. & Steel	10	.....	.....	5⅛	5⅛	.....	.....	.....	.....	.....	.....	5	5	143

*Reported by Townsend, Whelen & Co., 300 Walnut St., Philadelphia, Pa. Total sales 10,612 shares.
†Holiday.

LONDON. May 23.

Name and Country of Company	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Latest dividend. Date	Quotations. Buyers. £ s. d.	Quotations. Sellers. £ s. d.
Alaska-Treadwell, g., Alaska	200,000	5 0 0	3 0	Apr., 1903	4 12 6	4 17 6
Anaconda, c. s., Montana	1,200,000	5 0 0	2 0	May, 1903	4 18 9	5 1 3
Arizona, c., Def., ord	63,444	1 0 0	5 6	Feb., 1903	7 15 0	8 0 0
Arizona, pref., ord	316,350	1 0 0	5 6	Feb., 1903	8 0 0	8 5 0
Camp Bird, g., Colorado	738,000	1 0 0	0 7½	May, 1903	1 15 6	1 16 6
Central Chile, c., Chile	276,248	1 0 0	.....	.....	3 0	4 0
Copiapo, c., Chile	112,500	2 0 0	6 10	May, 1903	1 17 6	2 2 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	10 0	12 6
El Oro, g., Mexico	1,000,000	1 0 0	1 6	Dec., 1902	1 13 9	1 16 3
Frontino & Bolivia, g., Colombia	128,962	1 0 0	3 0	July, 1901	15 0	17 6
Le Roi, g., British Col	200,000	5 0 0	5 0	Nov., 1899	1 5 0	1 7 6
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	1 5 0	1 7 6
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	3 0	4 0
Montana, g. s., Montana	657,128	1 0 0	6	April, 1899	1 9	2 3
Mountain, c., Cal.	250,000	5 0 0	4 0	Nov., 1902	3 2 6	3 7 6
Stratton's Independence, Colorado	1,000,007	1 0 0	6	April, 1902	9 0	9 6
St. John del Rey., g., Brazil	546,265	1 0 0	8	June, 1903	15 0	16 0
Utah Con., g. c., (Highland Boy), Utah	300,000	1 0 0	7 0	Jan., 1903	5 10 0	6 0 0
Ymir, g., British Col.	200,000	1 0 0	1 0	Mar., 1902	8 9	11 3
European:						
Linares, l., Spain	15,000	3 0 0	9	Oct., 1902	2 15 0	3 5 0
Mascr. & Barry, c., sul., Port'g'l	185,172	1 0 0	11 0	May, 1903	3 7 6	3 12 6
Rio Tinto, c., Spain	325,000	5 0 0	27 6	Apr., 1903	49 15 0	50 0 0
Rio Tinto, pref., Spain	325,000	5 0 0	2 6	Apr., 1903	6 0 0	6 5 0
*Tharsis, c., Spain	625,000	2 0 0	6 0	May, 1903	4 0 0	4 5 0
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	495,388	1 0 0	1 6	Jan., 1900	1 17 6	2 0 0
Briseis, Tin, Tasmania	600,000	1 0 0	.....	.....	4 0	4 6
Broken Hill Pr'p., s., N. S. Wales	960,000	8 0	1 0	Feb., 1903	1 13 0	1 14 0
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	18 6	19 6
Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Apr., 1903	10 7 6	10 10 0
Great Fingall Con., W. Australia	250,000	1 0 0	5 0	Sept., 1902	7 15 0	7 17 6
Great Bo'd'r Pr'p., W. Australia	1,750,000	2 0	6	June, 1903	1 2 6	1 3 0
Ivanhoe Gold Corp., W. Australia	200,000	5 0 0	4 0	Jan., 1903	8 18 9	9 1 3
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	Apr., 1903	4 5 0	4 7 6
Lake View Cons., g., W. Australia	250,000	1 0 0	rts.	Aug., 1902	2 7 6	2 10 0
Mt. Lyell M. & R. I., c., Tasmania	275,000	3 0 0	1 0	Apr., 1903	3 3 9	3 6 3
*Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	May, 1903	3 10 0	3 15 0
Waihi, g., New Zealand	497,412	1 0 0	2 6	June, 1903	5 8 9	5 11 3
Indian:						
*Champion Reef, g., Colar Fields	473,000	10 0	4 6	May., 1903	7 8 9	7 11 3
Mysore Gold, Colar Fields	530,000	10 0	5 0	Mar., 1903	7 8 9	7 11 3
Nundydroog, g., Colar Fields	484,000	10 0	1 6	Mar., 1903	2 8 9	2 11 3
Ooregum, g., Colar Fields	343,000	10 0	1 6	Apr., 1903	1 13 9	1 16 3
Ooregum, pref., g., Colar Fields	240,000	10 0	1 6	Apr., 1903	2 3 9	2 6 3
African:						
Angelo, g, Transvaal	600,000	1 0 0	6 0	Feb., 1903	7 2 6	7 7 6
Bonanza, g., Transvaal	200,000	1 0 0	12 0	Feb., 1903	4 1 3	4 3 9
British South Africa	4,436,019	1 0 0	rts.	May, 1903	3 0 0	3 1 3
Cape Copper, S. Africa	300,000	2 0 0	1 0	June, 1903	2 16 3	2 18 9
Cape Copper, pref., S. Africa	75,000	2 0 0	1 0	June, 1903	3 2 6	3 7 6
City and Sub'n (New), g., Transvaal	340,000	4 0 0	8 0	Aug., 1899	6 11 3	6 13 9
Crown Reef, g., Transvaal	120,000	1 0 0	11 0	May. 1903	16 15 0	17 5 0
De Beers Con., d., pref., Cape Colony	800,600	2 10 0	10 0	Mar., 1903	19 12 6	19 15 0
De Beers Con., def.	1,000,000	2 10 0	12 6	Mar., 1903	21 15 0	22 15 0
East Rand, Prop, Transvaal	970,000	1 0 0	rts.	May, 1902	7 11 3	7 13 9
Ferreira g., Transvaal	90,000	1 0 0	2 0	May,. 1903	21 15 0	22 15 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	5 0	Feb., 1903	6 5 0	6 7 6
Geduld, g, Transvaal	400,000	1 0 0	rts.	Mar., 1902	7 2 6	7 5 0
Henry Nourse, g., Transvaal	125,000	1 0 0	8 0	Feb., 1903	9 2 6	9 7 6
Jagersfontein, d., Orange F. S.	200,000	5 0 0	6 0	Nov., 1899	30 2 6	30 7 6
Jubilee, g., Transvaal	50,000	1 0 0	5 0	June, 1903	5 5 0	5 10 0
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	3 10 0	3 15 0
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 0 0	4 2 6
May Con., g., Transvaal	288,750	1 0 0	3 0	Feb., 1903	4 5 0	4 7 6
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Feb., 1903	5 15 0	5 17 6
Modderfontein, g., Transvaal	290,000	1 0 0	rts.	Apr., 1902	10 8 9	10 11 3
Namaqua, c., Cape Colony	94,331	2 0 0	2 0	June, 1902	2 15 0	3 0 0
Primrose (New), g., Transvaal	325,000	1 0 0	2 0	Feb., 1903	3 16 3	3 18 9
Rand Mines, g., S. Africa	1,795,956	5 0	4 0	Aug., 1902	10 10 0	10 11 3
Robinson, g., Transvaal	750,000	5 0 0	8 0	Feb., 1903	10 10 0	10 15 0
Robinson Deep, g., Transvaal	960,000	1 0 0	5 0	May, 1899	4 17 6	5 0 0
Rose Deep, Transvaal	425,000	1 0 0	2 0	Feb. 1903	8 15 0	9 0 0
Salisbury, g., Transvaal	160,000	1 0 0	2 0	Mar., 1899	2 10 0	2 15 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1898	1 1 3	1 2 6
Village Main Reef, Transvaal	400,000	1 0 0	5 0	Oct., 1902	8 10 0	8 12 6
Wemmer, Transvaal	80,000	1 0 0	5 0	May, 1903	12 5 0	12 15 0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver. * Ex-Dividend

LONDON. (*By Cable*).*

Name of Company.	May 26. £.	s.	d.	June 2. £.	s.	d.	Name of Company	May 26. £.	s.	d.	June 2. £.	s.	d.
Anaconda	4	17	6	4	10	0	Johannesburg Invest	3	2	6	3	1	3
British South Africa	3	0	0	2	18	9	Modderfontein	10	3	9	10	5	0
Camp Bird	1	15	6	1	15	3	Rand Mines	10	7	6	10	7	6
Con. Gold-Fields	7	2	6	7	2	6	Rio Tinto com	49	0	0	47	5	0
De Beers Con. def	21	8	9	21	7	6	Simmer & Jack	1	11	3	1	11	3
East Rand	7	9	4½	7	10	0	Tomboy	1	15	0	1	15	0
El Oro, Mex	1	13	9	1	13	9	.....	.....			.....		
Jagersfontein	30	0	0	30	5	0	.....	.....			.....		

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. May 19.

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing Fr.
Boleo	Lower Cal.	Copper	.....	500	176.00	1,425.00	1,425.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	21.25	21.25
Fraser River	Brit. Col'mb.	Gold	250,000	25	.....	6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	101.00	102.50
Metaux, Cie. Fran. de	France	Metal dealers	25,000,000	500	22.50	468.50	466.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	482.00	470.00
Sedalia & California	Calif., U. S.	Oil	1,000,000	1	.....	9.00	8.75
Rebecca	Colo'do, U. S.	Gold	5,000,000	25	.....	0.50	0.75
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	655.00	657.00

TORONTO, ONT.* June 1.

Name of Company.	par val	Prices. High.	Prices. Low.	Sales.	Name of Company	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail	$1	.05½	.03	.....	Granby Smelter	$10	510	480	50
Cariboo (Mc. K.)	1	.14	.11	.....	Mountain Lion	1	.30	.20	.....
Cariboo (Hyd.)	1	.75	.....	.....	North Star	1	.14	.11	.....
Center Star	1	.31	.28	.....	Nova Scotia Steel, com	100	.94	.94	3,000
Crows Nest, C.	100	400	400	.....	Payne	1	.16	.14	.....
Dominion Coal, com	100	95	87	.....	Rambler Cariboo	1	.40	.....	.....
Dominion S. & I.	100	20	15¼	.....	Republic	1	.06	.03	.....
Dominion S. & I., pref.	100	.....	.....	.....	St. Eugene	1	.45	.35	.....
Fairview	1	.03½	.05¾	.....	Virtue	1	.08	.05	.....
Giant	1	.04	.02	3,500	War Eagle Con	1	.14	.11	5,500

*Standard Stock and Mining Exchange. Total sales 12,050 shares

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.—UNITED STATES.

Name and Location of Company.		Author-ized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903	Total to Date.	Latest. Date.	Amt.
Acacia, g	Colo.	$1,500,000	1,433,800	$1	$14,390	$57,590	Apr. 1903	.01
Adams, s. l. c	Colo.	1,500,000	150,000	10	.....	738,500	Oct. 1902	.05
Aetna Con., q	Cal.	500,000	100,000	5	.....	225,000	Apr. 1900	.15
Alaska-Mexican, g	Alaska.	1,000,000	180,000	5	36,000	501,381	Apr. 1903	.10
Alaska-Treadwell, g	Alaska.	5,000,000	200,000	25	230,000	5,050,000	Apr 1903	.75
Amalgamated, c	Mont.	155,000,000	1,538,879	100	1,538,880	21,195,540	May 1903	.50
Am. Sm. & Ref., pf	U. S.	50,000,000	500,000	100	1,750,000	10,641,553	Apr. 1903	1.75
Anaconda, c	Mont.	30,000,000	1,200,000	25	600,000	22,650,000	May. 1903	.50
Annie Laurie, g	Utah.	5,000,000	50,000	100	125,000	185,000	June. 1903	1.00
Arizona, c	Ariz.	3,775,000	.....	.....	501,534	3,947,032	Feb. 1903	.....
Atlantic, c	Mich.	1,000,000	40,000	25	.....	940,000	Feb. 1901	2.00
Bald Butte, g. s	Mont.	250,000	250,000	1	15,000	1,312,148	Jan. 1903	.06
Boston & Colo. Sm	Colo.	750,000	15,000	50	.....	402,350	Oct. 1902	.75
Boston Gold-Copper Sm	Colo.	1,000,000	1,000,000	1	.....	150,000	Nov 1901	.02½
Boston & Mont. Con., c. s. g	Mont.	3,750,000	150,000	25	600,000	27,725,000	Apr. 1903	2.00
Breece, l. s	Colo.	5,000,000	200,000	25	10,000	200,000	June. 1903	.05
Bunker Hill & Sullivan	Idaho	3,000,000	300,000	10	54,000	1,496,000	June. 1903	.03
Butte & Boston, c	Mont.	2,000,000	200,000	10	.....	1,600,000	Nov. 1901	3.00
Butterfly-Terrible, g	Colo.	1,500,000	1,250,000	1	.....	31,250	Oct. 1901	.00⅝
C. K. & N., g	Colo.	1,500,000	1,431,900	1	28,638	42,957	June. 1903	.01
Calumet & Hecla, c	Mich.	2,500,000	100,000	25	1,500,000	81,350,000	June. 1903	10.00
Camp Bird, g	Colo.	5,500,000	820,000	5	233,700	455,100	May 1903	.15
Carisa g. s. c	Utah.	500,000	500,000	1	.....	30,000	Nov. 1901	.03
Centennial Eureka, g. s. l. c	Utah.	5,000,000	100,000	25	.....	2,667,700	Jan. 1902	.50
Center Creek, l. z	Mo	1,000,000	100,000	10	.....	80,000	Mar. 1902	.10
Central Eureka, g	Cal.	4,000,000	398,425	10	.....	23,718	Sept. 1902	.02
Central, l	Mo	1,000,000	10,000	100	25,000	350,000	May. 1903	.50
Champion, c	Mich.	2,500,000	100,000	25	100,000	100,000	May. 1903	1.00
Cherry Hill, g	Cal.	1,000,000	1,000,000	1	.....	47,500	June. 1902	.00½
Chippewa Con., g. s. l	Colo.	150,000	150,000	1	.....	2,500	Dec. 1902	.00½
Con. Mercur, g	Utah.	5,000,000	1,000,000	5	150,000	1,000,000	May 1903	.03
Continental, z	Mo	550,000	22,000	25	17,600	35,200	Apr. 1903	.40
Cripple Creek, g pf	Colo.	125,000	125,000	1	.....	45,000	Jan. 1902	.04
Croesus, g	Cal.	1,000,000	200,000	5	.....	227,300	Aug. 1901	.05
Dalton & Lark, g. s. l	Utah.	2,500,000	2,500,000	1	.....	350,000	July. 1901	.10½
Daly West,	Utah.	3,600,000	180,000	20	540,000	2,700,000	May 1903	.60
De Lamar, g	Idaho	400,000	67,181	5	.....	2,708,094	Oct. 1902	.48
Doctor-Jack Pot Con., g	Colo.	3,000,000	2,900,000	1	.....	232,000	Aug. 1901	.01
Doe Run, l	Mo	1,500,000	15,000	100	45,000	582,072	Apr. 1903	1.50
Ducktown c. i. sul. (Ord)	Tenn.	374,000	74,800	5	.....	165,250	Dec. 1901	.25
Ducktown (Fndr)	Tenn.	1,000	200	5	.....	75,250	May. 1901	75.00
Elkton Con., g	Colo.	3,000,000	2,500,000	1	.....	1,404,461	Mar. 1902	.04
Empire State-Idaho, l. s	Idaho	6,000,000	505,542	10	126,385	1,688,047	May 1903	.05
Free Coinage, g	Colo.	1,000,000	10,000	100	.....	160,000	Dec. 1902	.20
Gemini,	Utah.	500,000	5,000	100	50,000	900,006	Mar. 1903	10.00
Gold Coin of Victor, g	Colo.	1,000,000	1,000,000	1	10,000	1,230,000	Jan. 1903	.01
Gold King, g	Colo.	1,000,000	936,850	1	18,737	430,951	Apr. 1903	.02
Golden Argus, g	Cal.	800,000	8,000	100	.....	2,000	Dec. 1902	.25
Golden Cycle, g	Colo.	2,000,000	1,500,000	1	157,500	213,750	May 1903	.03
Golden Eagle, g	Colo.	500,000	489,015	1	.....	98,916	Sept. 1901	.01
Good Hope, g. s	Colo.	50,000	500	100	12,500	12,500	Jan. 1903	.25
Grand Central, g	Utah.	250,000	250,000	1	75,000	703,250	May 1903	.10
Gwin, g	Cal.	1,000,000	100,000	10	.....	426,500	Dec. 1902	.15
Hecla Con., s. l	Mont.	1,500,000	30,000	50	.....	2,930,550	Apr. 1903	.25
Homestake, g	S. D.	21,840,000	218,400	100	273,300	11,985,150	May 1903	.25
Horn Silver, g. s. c. z. l	Utah.	10,000,000	400,000	25	.....	5,342,000	Dec. 1901	.10
Independence Con., g	Colo.	2,500,000	2,500,000	1	.....	281,375	Apr. 1901	.04
Ingham Con., g	Colo.	750,000	1,359,600	⅓	.....	33,981	Aug. 1901	.00¾
International Nickel, pf	U. S.	12,000,000	87,415	100	349,660	349,660	May 1903	4.00
Iowa, g. s. l	Colo.	1,000,000	1,000,000	1	33,334	303,568	Apr. 1903	.01
Iron Silver,	Colo.	10,000,000	500,000	20	100,000	2,750,000	May 1903	.10
Isabella, g	Colo.	2,250,000	2,250,000	1	.....	742,500	Mar. 1901	.01
Jamison g	Cal.	3,900,000	390,000	10	11,700	74,100	Jan. 1903	.03
Kendall, g	Mont.	2,500,000	500,000	5	20,000	95,000	May 1903	.04
Kennedy, g	Cal.	10,000,000	100,000	100	.....	1,801,000	June. 1901	.05
La Fortuna, g	Ariz.	250,000	250,000	1	.....	1,062,500	Oct. 1902	.05
Last Dollar, g	Colo.	1,500,000	1,500,000	1	30,000	210,000	Mar. 1903	.02
Liberty Bell, g	Colo.	700,000	130,349	5	39,104	52,139	Apr. 1903	.15
Lightner, g. s	Cal.	125,000	102,255	1	15,338	48,689	May 1903	.10
Mammoth, g. s. c	Utah.	10,000,000	400,000	25	.....	1,800,000	July. 1901	.05
Mary McKinney, g	Colo.	1,000,000	1,000,000	1	60,000	530,000	Apr. 1903	.03
May Day, g	Utah.	100,000	400,000	¼	.....	30,000	Mar. 1902	.01
Midget, g	Colo.	1,000,000	1,000,000	1	.....	195,000	Apr. 1902	.15
Mines Co. of America, Fine'l	U. S.	2,000,000	2,000,000	1	125,000	155,000	May. 1903	.01¼
Modoc, g. s	Colo.	500,000	500,000	1	5,000	255,000	Jan. 1903	.01
Mont. Ore Purchasing	Mont.	2,500,000	81,000	25	162,000	2,868,000	Jan. 1903	2.00
Mountain, c	Cal.	6,250,000	250,000	25	.....	3,833,750	Nov. 1902	.96
Mine La Motte, l	Mo	3,000,000	300,000	10	120,000	120,000	Apr. 1903	.20
Napa Con., q	Cal	700,000	100,000	7	.....	1,180,000	Oct. 1902	.10
National Lead, com	U. S.	15,000,000	149,054	100	.....	1,341,486	Mar. 1900	1.00
National Lead, pfd	U. S.	15,000,000	149,040	100	521,640	13,448,528	June. 1903	1.75
New Idria, q	Cal.	5,000,000	100,000	5	60,000	460,000	Apr. 1903	.30
New Jersey, z	U. S.	10,000,000	100,000	100	300,000	5,100,000	Feb. 1903	3.00
New Leadville Home, g	Colo.	2,000,000	2,000,000	1	.....	365,500	Feb. 1902	.00⅝
Nugget, g	Colo.	1,000,000	991,000	1	.....	84,730	July. 1901	.01
Ontario, s. l	Utah.	15,000,000	150,000	100	.....	14,997,000	Dec. 1902	.30
Osceola, c	Mich.	2,500,000	98,150	25	.....	4,247,300	Dec. 1901	3.00
Parrot, c	Mont.	2,300,000	229,850	10	.....	5,772,925	Jan. 1902	.50
Pioneer, g	Alaska.	5,000,000	50,000	100	.....	300,000	Dec. 1902	6.00
Pointer, g	Colo.	1,250,000	1,250,000	1	.....	25,000	June. 1901	.01
Portland, g	Colo.	3,000,000	3,000,000	1	180,000	4,477,080	Apr. 1903	.05
Pride of the West	Ariz.	1,500,000	150,000	10	.....	15,000	Oct. 1902	.10
Quicksilver, pfd	Cal.	4,300,000	43,000	100	21,500	1,931,411	May. 1903	.50
Quincy, c	Mich.	2,500,000	100,000	25	250,000	13,820,000	Feb. 1903	2 50
Rob Roy, z	Mo	15,000	13,725	1	1,235	1,480	May 1903	.05
Rocco-Homestake-Nevada, l. s	Nev.	300,000	240,000	1	.....	90,000	Nov. 1902	.01
Sacramento, g	Utah.	5,000,000	1,000,000	5	30,000	163,000	June. 1903	.00¼
St. Joseph, l	Mo	6,000,000	375,000	10	56,250	3,665,750	Mar. 1903	.15
Silver Hill, g. s	Nev.	180,000	180,000	1	9,000	19,800	Mar. 1903	.05
Silver King, g. s. l	Utah.	3,000,000	150,000	20	600,000	6,650,000	June. 1903	.66⅔
Smuggler, s. l. z	Colo.	1,000,000	1,000,000	1	.....	2,175,000	Feb. 1902	.01
Spearfish, g. pf	So. Dak	1,000,000	882,000	1	35,280	52,920	Apr. 1903	.01
Specie Payment, g	Colo.	1,000,000	100,000	1	.....	40,190	Oct. 1902	.0
Standard Con., g. s	Cal.	2,000,000	178,394	10	35,678	4,142,492	May. 1903	.10
Standard, c	Ariz.	500,000	400,000	1	10,000	10,000	Mar. 1903	.02½
Standard, s. l	Idaho.	500,000	500,000	1	125,000	2,845,000	May. 1903	.05
Stratton's Independence, g	Colo.	5,500,000	1,000,007	5	.....	3,665,271	Jan. 1902	.12
Swansea, s. l	Utah.	500,000	100,000	5	.....	330,500	June 1901	.05
Syndicate, g	Cal.	100,000	100,000	1	.....	82,000	Aug. 1902	.02
Tamarack, c	Mich.	1,500,000	80,000	25	.....	8,490,000	Dec. 1901	10.00
Tomboy, g. s	Colo.	1,500,000	300,000	5	.....	1,244,000	July. 1902	.24
Town Topics, g. c	Colo.	1,000,000	1,000,000	1	5,000	40,000	Mar. 1903	.00¾
Trimountain, c	Mich.	2,500,000	100,000	25	300,000	300,000	June. 1903	1 50
Trinity County, g	Cal.	1,000,000	100,000	10	30,000	30,000	June. 1903	.05
United, (Creede) g	Colo.	500,000	500,000	1	10,000	45,000	May. 1903	.02
Union, g	Colo.	1,250,000	1,250,000	1	.....	445,244	Jan. 1902	.02
United, c, pf	Mont.	5,000,000	50,000	100	150,000	300,000	May. 1903	3.00
United, g. l	Colo.	5,000,000	3,994,799	1	40,091	319,933	Jan. 1903	.01
United, z. l. com	Mo	5,000,000	78,990	5	7,764	22,981	Apr. 1903	.05
United, z. l. pfd	Mo	1,000,000	18,998	25	17,040	99,095	Apr. 1903	.50
United Verde, c	Ariz.	3,000,000	300,000	10	450,000	13,485,322	May. 1903	.75
U. S. Red. & Ref., com	Colo.	6,000,000	59,188	100	177,564	354,790	June. 1903	1.00
U. S. Red. & Ref., pf	Colo.	4,000,000	39,458	100	177,561	413,634	June. 1903	1.50
Utah, g	Utah.	1,000,000	100,000	10	10,000	217,000	May. 1903	.02
Utah Con., c	Utah.	1,500,000	300,000	5	594,000	1,236,000	Jan. 1903	1.98
Vindicator Con., g	Colo.	1,500,000	1,100,000	1	110,000	1,027,000	Apr. 1903	.05
Waldorf, g	Colo.	3,000,000	3,000,000	1	.....	25,000	Dec. 1902	.01½
Wasp No. 2, g	S. Dak	500,000	147,900	1	.....	218,410	June. 1902	.00½
White Rock, g	Nev.	500,000	200,000	2½	.....	2,000	Aug. 1902	01
Wolverine, c	Mich.	1,500,000	60,000	25	150,000	1,050,000	Apr. 1903	2.50
Yankee Con., g. s. l	Utah.	500,000	500,000	1	.....	75,000	Apr. 1902	.05
Yellow Aster, g	Cal.	1,000,000	100,000	10	40,000	513,789	May. 1903	.10

NOTE.—These dividends are published gratuitously. Readers are invited to send any corrections or additions which theythink necessary to complete our list.

COAL, IRON AND INDUSTRIALS.

Name and Location of Company.		Author-ized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903.	Total to Date.	Latest. Date.	Amt.
Ala. Con., Coal & Iron, pfd	Ala.	$2,500,000	$24,638	$100	$86,234	$603,646	June. 1903	$1.75
Ala. & Ga. Iron, pf		650,000	6,500	100	6,500	6,500	Jan. 1903	1.00
Ailis-Chalmers, pfd	U. S.	25,000,000	200,000	100	568,750	2,638,375	May. 1903	1.75
Alma Oil	Cal.	400,000	380,000	1	22,800	22,800	June. 1903	.03
Altoona Coal & Coke Co	Pa.	2,500,000	250,000	10	.....	75,000	Jan. 1901	.30
Amer. Agr. Chem., pfd	U. S.	30,000,000	181,350	100	544,050	4,126,710	Apr. 1903	3.00
American Cement	Pa.	2,100,000	200,000	10	160,000	540,000	Apr. 1903	.40
American Coal	Md	1,500,000	60,000	25	75,000	1,357,500	Mar. 1903	1.25
American Iron & Steel, com	Pa.	17,000,000	34,000	50	.....	256,100	May 1902	.15
American Iron & Steel, pfd	Pa.	3,000,000	60,000	50	75,000	525,000	Apr. 1903	.62½
American Steel Foundries, pfd	U. S.	15,500,000	155,000	100	465,000	697,500	June. 1903	1.50
Aztec Oil	Cal.	250,000	235,000	1	9,400	25,850	May. 1903	.03
Cambria Steel	Pa.	50,000,000	900,000	50	675,000	5,775,000	Feb. 1903	.75
Central Coal & Coke, com	Mo	5,125,000	51,250	100	153,750	397,500	Apr. 1903	1.50
Central Coal & Coke, pfd	Mo	1,875,000	18,750	100	46,874	749,998	Apr. 1903	1.25
Central Oil	W.Va.	1,500,000	60,000	25	15,000	137,500	May 1903	.25
Central Oil	Cal.	1,000,000	800,000	1	.....	160,247	Jan. 1902	.03
Colorado Fuel & Iron, com	Colo.	38,000,000	239,310	100	.....	1,642,500	Apr. 1902	1.75
Colorado Fuel & Iron, pfd	Colo.	2,000,000	20,000	100	80,000	1,560,000	Feb. 1903	4.00
Columbus & Hocking C. & I	Ohio	7,000,000	69,220	100	34,610	69,220	Mar. 1903	.50
Consolidation Coal	Md.	10,250,000	102,500	100	205,000	8,536,650	Jan. 1903	2.00
Consolidated Coal	Ill.	5,000,000	50,000	100	.....	100 000	Jan. 1902	1.00
Crucible Steel, pfd	U. S.	25,000,000	250,000	100	437,500	4,375,000	Mar. 1903	1.75
Cummings Cement	N. Y.	300,000	3,000	100	.....	180,000	July 1902	9.00
Dixon, Joseph, Crucible	N. J.	1,000,000	7,345	100	14,690	.....	Apr. 1903	1.00
Empire Steel & Iron, pfd	U. S.	5,000,000	23,700	100	35,550	355,442	Jan 1903	1.50
Four Oil	Cal.	300,000	208,700	1	8,348	35,479	May. 1903	.01
General Chem., com	U. S.	12,500,000	74,103	100	185,258	1,116,279	June. 1903	1.25
General Chem., pfd	U. S.	12,500,000	100,000	100	291,240	2,286,418	Apr. 1903	1.50
George's Creek Coal & Iron	Md	2,500,000	22,000	100	33,000	.....	Jan. 1903	3.00
Giant Oil	Cal.	500,000	500,000	1	5,000	5,000	Jan. 1903	.01
Hanford Oil	Cal.	20,000	2,000	10	.....	13,000	Sept. 1902	1.50
Heywood Oil	Tex.	800,000	800,000	1	16,000	144,000	Jan. 1903	.02
Higgins Oil	Tex.	2,500,000	17,600	100	.....	96,850	Apr. 1902	1.50
Home Oil	Cal.	100,000	100,000	1	37,500	487,500	May 1903	.07½
Homestake Oil	Cal.	100,000	10,000	10	.....	33,000	Aug. 1902	.15
Houston Oil, pfd	Tex.	7,500,000	75,000	100	224,125	266,500	Feb. 1903	3.00
Imperial Oil	Cal.	1,000,000	100,000	100	120,000	380,000	June. 1903	.20
Int'l Acheson Graphite, pfd	N. Y.	500,000	5,000	100	17,500	87,500	Feb. 1903	3 50
Jeff. & Clearf., Coal & Iron, com	Pa.	1,500,000	15,000	100	.....	105,000	Aug. 1902	5.00
Jeff. & Clearf., Coal & Iron, pfd	Pa.	1,500,000	15,000	100	37,500	563,060	Feb. 1903	2.50
Lehigh Coal & Nav	Pa.	14,346,350	286,933	50	286,933	29,382,053	May 1903	1.00
Maryland Coal, pfd	Md.	2,000,000	18,850	100	.....	885,910	Dec. 1902	5.00
Monongahela R. Coal, pfd	Pa.	10,000,000	98,300	50	347,165	2,777,180	Jan. 1903	3.50
Monte Cristo Oil	Cal.	500,000	500,000	1	20,000	20,000	May. 1903	.01
National Carbon, pf	U. S.	4,500,000	45,000	100	157,500	1,417,500	May 1903	1.75
Ohio & Indiana Natural Gas	U. S.	10,000,000	90,000	100	90,000	1,170,000	Mar. 1903	1.00
Pacific Coast Borax	Cal.	2,000,000	19,000	100	95,000	1,312,500	May 1903	1.00
Peerless Oil	Cal.	1,000,000	92,000	10	66,240	113,520	June. 1903	.14
Pennsylvania Salt Mfg	Pa.	5,000,000	100,000	50	150,000	13,300,000	Apr. 1903	3.00
Penna. Steel of N. J	Pa.	25,000,000	168,214	100	588,750	2,917,000	May 1903	3.50
Philadelphia Gas, com	Pa.	16,102,131	308,542	50	462,812	2,954,019	May 1903	.75
Philadelphia Gas, pfd	Pa.	3,808,350	212,573	50	99,959	996,168	Mar. 1903	1.25
Pittsburg Coal, pfd	Pa.	32,000,000	297,012	100	1,039,542	7,276,794	Apr. 1903	1.75
Pittsburg Oil	Cal.	300,000	220,000	1	12,000	12,000	May. 1903	.02½
Rep. Iron & Steel, pfd	U. S.	25,000,000	203,569	100	712,492	5,336,786	Apr. 1903	1.75
Retsof Salt	N. Y.	5,000,000	36,000	100	72,000	648,000	Apr. 1903	1.00
San Joaquin Oil	Cal.	100,000	100,000	1	10,000	70,000	Apr. 1903	.05
Shelby Iron	Ala.	1,000,000	10,000	100	10,000	700,000	May 1903	10.00
Sloss-Sheffield Steel & Iron, pfd	Ala.	20,000,000	65,085	100	228,000	1,482,000	Apr. 1903	1.75
St. Bernard Coal & Coke	Ky-Tenn	1,000,000	10,000	100	.....	770,000	Dec. 1902	6.00
Standard Oil (of N. J.)	U. S.	100,000,000	720,000	100	36,196,000	190225,000	June. 1903	7.00
Susquehanna I. & S., pfd	Pa.	1,500,000	300,000	5	45,000	717,500	Jan. 1903	.15
Temple Iron	Pa.	240,000	2,400	100	7,200	14,400	Jan. 1903	3.00
Tenn. C. I. & R. R., com	Tenn	23,000,000	225,536	100	.....	1,102,144	Nov. 1900	2.00
Tenn. C. I. & R. R., pfd	Tenn		248,000	2,480	100	9,920	297,135	May. 1903	2.00
Tex. & Pacific Coal	Tex.		2,000,000	20,000	100	60,000	2,100,000	Apr. 1903	1.50
Thirty-three Oil	Cal.		500,000	10,000	5	60,000	180,000	June. 1903	.10
Thomas Iron	Pa.		2,500,000	25,000	100	.....	200,000	Aug. 1902	4.00
Tidewater Steel, pfd	Pa.		600,000	60,000	10	18,000	18,000	Jan. 1903	.30
Union Oil	Cal.		10,000,000	52,672	100	36,870	334,405	Jan. 1903	.70
U. S. Steel Corp., com	U. S.		550,000,000	5,083,025	100	10,166,050	45,726,552	June. 1903	1.00
U. S. Steel Corp., pfd	U. S.		550,000,000	5,102,811	100	17,859,838	80,332,910	May. 1903	1.75
Va.-Carolina Chem., com	U. S.		38,000,000	279,844	100	699,610	3,678,889	June. 1903	1.25
Va.-Carolina Chem., pfd	U. S.		12,000,000	120,000	100	480,000	6,540,000	Apr. 1903	2.00
Victoria Coal & Coke, com	W. Va.		150,000	1,500	100	.....	15,000	Jan. 1901	10.00
Victoria Coal & Coke, pfd	W. Va.		100,000	1,000	100	.....	15,000	July. 1902	3.00
Westmoreland Coal	Pa.		5,000,000	250,000	50	375,000	7,875,000	Apr. 1903	1.50
West Shore Oil	Cal.		100,000	100,000	1	30,000	75,000	June. 1903	.05

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Name and Location of Company.		Author-ized Capital Stock.	Shares. Issued.	Par al	Dividends. Paid 1903.	Total to Date.	Latest. Date.	Amt.
Amistad y Concordia	Mex.	$480,000	9,000	$50	$41,898	$120,898	Apr. 1903	$2.62
Barreno,	Mex.		2,400		8,332	51,882	May. 1903	.84
Bartolome de Medina Mill	Mex.	50,000	2,000	25	7,035	70,518	May. 1903	.63
Butler's Salvador	Salv	750,000	150,000	5	36,000	38,000	May. 1903	.24
Cariboo McKinney, g	B. C.	1,250,000	1,250,000	1	.....	496,837	Mar 1902	.01½
Center Star, g	B. C.	3,500 000	3,500,000	1	.....	210,000	May. 1903	.01
Cinco Senores	Mex.		2,000		39,070	695,135	May. 1903	4.20
Copiapo, c	Chile	1,125,000	112,500	10	39,900	2,865,900	Feb. 1903	.36
Dolores, g. s	Mex.	100,000	100,000	1	25,000	25,000	Jan. 1903	.25
Dominion Iron & Steel, pf	N. S.	5,000,000	50,000	100	175,000	700,000	Apr. 1903	3.50
Dominion Coal, pf	N. S.	3,000,000	30,000	100	120,000	2,280,000	Apr. 1903	2.00
Dos Estrellas	Mex.	150,000	3,000	50	97,550	332,550	May. 1903	12.60
El Oro, g. s	Mex.	5,000,000	1,000,000	5	.....	1,886,100	Dec. 1902	.36
Esperanza, s. g	Mex.	150,000	3,000	50	58,620	1,128,699	June. 1903	4.20
Frontino & Bolivia c	Colom.	643,310	128,662	5	.....	1,211,703	July 1901	.72
Goodenough, s. l	B. C.	800,000	659,400	1	.....	13,188	Jan. 1902	.01
Greene Con., c	Mex.	7,200,000	720,000	10	432,000	652,000	May. 1903	.20
Guadalupana	Mex.	15,000	3,000	5	4,620	67,620	Feb. 1903	.77
Guadalupe Mill	Mex.	1,000,000	10,000	100	30,800	1,515,750	Apr. 1903	.77
Le Roi, g	B. C	5,000,000	200,000	25	.....	1,305,000	Nov 1899	1.20
Le Roi No. 2, g	B. C.	3,000,000	120,000	25	.....	288,000	May. 1902	1.20
Mesquital	Mex.	125,000	250,000	½	15,000	51,458	Feb. 1903	.06
Metalurgical Co., of Torreou	Mex.	1,500,000	30,000	50	269,500	269,500	Apr. 1903	8.98
Natividad, s. g	Mex.	36,000	2,400	15	30,480	194,106	May. 1903	4.20
N. Y. & Hond. Rosario, s. g	C. A.	1,500,000	150,000	10	75,000	1,925,000	May. 1903	3.08
North Star, s. l	B. C.	1,500,000	1,300,000	1	.....	581,356	Dec. 1902	.01½
Nova Scotia St. & Coal, com	N. S.	5,000,000	41,200	100	123,600	391,400	Apr. 1903	1.00
Nova Scotia St. & Coal, pfd	N. S.	2,000,000	10,300	100	41,200	164,800	Apr. 1903	2.00
Payne Con., s. l	B. C.	3,000,000	2,000,000	1	.....	1,438,000	Jan. 1901	.03
Penoles (Map.), s. l	Mex.	125,000	2,500	50	47,825	2,026,114	Jan. 1903	19.13
Providencia (S. J.)	Mex.	90,000	6,000	15	13,860	174,360	Mar. 1903	.77
Rambler-Cariboo, s. l	B. C.	1,250,000	1,250,000	1	.....	220,000	Nov 1902	.01
Real del Monte	Mex.		2,554		9,833	2,883,083	Feb. 1903	3.85
St. John del Rey, g	Brazil	3,000,000	546,285	5	87,402	14,083,397	June. 1903	.16
Soledad, s. l	Mex.	19,200	960	20	13,191	235,432	May. 1903	4.20
Sorpresa	Mex.	19,200	960	20	3,852	189,505	May. 1903	2.10
Sta. Maria de Guadalupe	Mex.	2,500	2,500	1	.....	377,918	Sept. 1902	4.08
Sta. Maria de la Paz	Mex.		2,400		.....	1,848,273	Dec. 1902	7.65
San Francisco Mill	Mex.	50,000	6,000	25	.....	284,760	Nov 1902	.40
Sta. Gertrudis	Mex.	1,920,000	38,400	50	67,320	2,714,664	May. 1903	.....
San Rafael	Mex.	60,000	2,400	25	54,524	1,827,592	May. 1903	.....
Union Mill	Mex.	150,000	3,000	50	11,325	395,795	Apr. 1903	1.90
Ymir, g	B. C.	1,000,000	200,000	5	.....	288,000	Mar 1902	.24

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

	Cust. Meas.	Price.
ABRASIVES—		
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont. car-lots, f.o.b., Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, Turkish flour in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Naxos flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Chester flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg.ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h. gr.	"	26.00
Garnet, as per quality	sh.ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01¾@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.40
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"	.06
ALCOHOL—Grain	gal.	2.40@2.42½
Refined wood 95@97%	"	.60@.65
Purified	"	1.20@1.50
ALUM—Lump	100 lbs.	1.75
Ground	"	1.85
Porous	"	.80
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08¼
Muriate	"	.05⅝
Lump	"	.09
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¼
Oxide, com'l white, 95%	"	.09½
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White powd.	"	.03@.03⅛
Red	"	.06½@.06¾
ASPHALTUM—		
Ventura, Cal.	sh.ton	32.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh. ton	35.00
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	sh. ton	21.00
Gilsonite, Utah, ordinary	lb.	.03
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh.ton	25.00@27.50
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100lbs.	1.67½@1.76
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05⅛
BARIUM		
Sulphate (Blanc Fixe)	lb.	$0.01⅞
BARYTES—		
Am. Crude, No. 1	sh.ton	9.00
Crude, No. 2	"	8.00
Crude, No. 3	"	7.75
Floated	"	18.25
Foreign, gray	"	14.00
Snow white	"	17.00
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines:		
First Grade	lg.ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02¼@.02½
BORAX	"	.07¼@.07½
BROMINE—Bulk.	"	.35
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.40
" brown	"	.95
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton	70.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	2.00@2.15
Foreign	"	1.95@2.50
"Rosendale," 300 lbs	"	.80
Slag cement, imported	"	1.65
CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14
CHALK—Lump, bulk	Sh.ton	3.00
Ppt. per quality	lb.	.04¼@.05¼
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg.ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton	8.25
Am. best, ex-dock, N. Y.	"	9.25
English, common	"	10.50
Best grade	"	16.25
Fire Clay, ordinary	sh.ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.26@2.30
Gray	"	2.28@2.40
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—in bulk	100 lbs.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25 lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for ultro, (32-2-10° Be.)	"	.13¼@.13⅞
FELDSPAR—Ground	sh.ton	8.00@9.00
FLINT PEBBLES—Dan. Best.	lg.ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Am. lump, 1st grade	sh.ton	14.40
2d grade	"	13.90
Gravel and crushed, 1st gr	"	13.40
2d grade	"	12.40
Ground, 1st grade	"	17.90
Ground, 2d grade	"	16.50
Foreign, lump	"	8.00@12.00
Ground	"	11.50@14.00
FULLER'S EARTH—	100 lbs.	.80
GRAPHITE—Am. f.o.b. Providence, R. I., lump	sh.ton	$8.00
Pulverized	"	30.00
German, com. pulv	lb.	.01¼@.01¼
Best pulverized	"	.01½@.02
Ceylon, common pulv	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulv	"	.01¼
GYPSUM—Ground	sh.ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg.ton	4.00
INFUSORIAL EARTH—Gr'd.	"	14.00@16.00
American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01¼
True	"	.04
Oxide, pure copperas color.	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	"	.08¼@.08½
Brown	"	.06¼@.06½
Nitrate, com'l	"	.06½
" gran.	"	.08¼
LIME—Com., abt. 250 lbs.	bbl.	.75
Finishing	"	.95
MAGNESITE—Greece.		
Crude (95%)	lg. ton	5.50@6.00
Calcined	sh.ton	17.50@18.00
Bricks best imp., f.o.b., N.Y.	M.	155.00
" domes., per qual., f.o.b. Pittsburg	"	160.@200.
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01⅜
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—Powdered, 70@75% binoxide	lb.	.01¼@.01½
Crude pow'd. 75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore, 50%, Foreign	unit	.18@.19
Domestic	"	.30
MARBLE—Flour	sh.ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse	sh.ton	33.00@38.00
Fine	lb.	.00⅞@.02
Sheets, N. C., 2x4 in.	"	.30
3x3 in.	"	.80
3x4 in.	"	1.50
4x4 in.	"	2.00
6x6 in.	"	3.00
MINERAL WOOL—		
Slag, ordinary	sh.ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.: 25@30, cold test	gal.	.13@.13½
15, cold test	"	.13½@.14
Zero	"	.18@.18½
Summer	"	.12½@.13
Cylinder, dark steam ref.	"	.14½@.15
Dark, filtered	"	.18½@.19
Light, filtered	"	.20½@.20
Extra cold test	"	.25@.31
Gasoline, 86°@90°	"	.16@.21
Naphtha, crude, 68°@72°	bbl.	11.20
"Stove"	gal.	.14½
Linseed, domestic raw	"	.41@44
Boiled	"	.46
Calcutta, raw	"	.75
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	.10¼
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05⅝@.06
English flake	"	.08¼@.08½
Glassmakers'	"	.06½@.08¼
PAINTS AND COLORS—	Cust. Meas.	Price.
Metallic, brown	sh.ton	$19.00
Red	"	16.00
Ocher, Am. common	"	9.25@10.00
Best	"	21.25@25.00
Dutch, washed	lb.	.04¾
French, washed	"	.01½@.01⅞
Orange mineral, Am.	"	.08⅛@.08⅜
Foreign, as to make	"	.08½@.10¼
Paris green, pure, bulk	"	.12
Red lead, American	"	.06¼@.06½
Foreign	"	.06⅝@.08
Turpentine, spirits	gal.	.49@.49½
White lead, Am., dry	lb.	.05½@.05⅝
American, in oil	"	.07@.09
Foreign, in oil	"	.07@.07¼
Zinc, white, Am., ex dry	"	.04⅝@.04⅞
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASH		
Caustic, ordinary	"	.04½@.04⅞
Elect. (90%)	"	.06¼
POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran.	"	.14
Bichromate, Am.	"	.08⅛@.08¼
Scotch	"	.08½@.09
Bromide, bulk	"	.22
Carbonate (80@85%)	"	.03½@.04
Chlorate, powd.	"	.07⅛@.07¼
Crystals	"	.07@.07⅛
Chromate	"	.35
Cyanide (98@99%)	"	.20
Kainit	lg.ton	9.30
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09⅛@.09⅝
Prussiate, yellow	"	.13¼@.13½
Red	"	.34
Sulphate, 90%	100 lbs.	2.11
96%	"	2.14
Sylvanit	unit	.41
QUARTZ—(See Silica).		
SALT—N. Y. com. fine 280 lbs	bbl.	.72@1.18
N. Y. agricultural	sh.ton	4.40
SALTPETRE—Crude	100 lbs.	3.45
Refined	"	4.00@4.50
SILICA—Best foreign	lg.ton	10.00@11.00
Ground quartz, ord.	sh.ton	6.00@8.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.34½
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ordinary, f.o.b. w'ks	100 lbs.	1.25
Extra domes, f.o.b. w'ks	"	3.50
Foreign, f.o.b. N. Y.	"	1.60
Bichromate	lb.	.06¼
Carbonated ash, high test, in bags, f.o.b. works.	100 lbs.	.75@.82½
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 60@78%, f.o.b. w'ks	"	1.70@1.75
Foreign, f.o.b. N. Y.	"	1.90@2.00
Chlorate, com'l	"	.07¼@.07⅝
Hyposulphite, Am.	"	1.60@1.65
German	"	1.70@1.90
Nitrate, spot	"	2.30
Shipments	"	2.00
Peroxide	lb.	.45
Phosphate	"	.02½@.02¼
Prussiate	"	.09⅝
Sal soda, f.o.b. works	100 lbs.	.55
Foreign, f.o.b. N. Y.	"	.67½
Silicate, conc.	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lbs.	82½
Sulphide	lb.	.01¼
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.15
TALC—N. C., 1st grade	sh.ton	18.00
N. Y., Fibrous, best	"	10.20
French, best	100 lbs.	1.25
Italian, best	"	1.62½
TAR—Regular	bbl.	2.40
Oil barrels	"	4.40
TIN—Crystals	lb.	.23
Oxide	"	.45
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09¼
Carbonate, ppt.	"	.09
Chloride solution, com'l	"	.02¼
Chloride granular	"	.04¼@.04⅝
Dust	"	.04⅝@.04½
Sulphate	"	.02½@.02⅝

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.35
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07⅛@.08¼
THORIUM—Nitrate 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
YTTRIUM—Nitrate	lb.	40.00
ZIRCONIUM—Nitrate	"	8.00

Note.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the Engineering and Mining Journal are requested to report any corrections needed, or to suggest additions which they may consider advisable.